The
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Making Headway

THE grand objective of the Electrical Development Association is to increase the sale of electricity. Only for that purpose is the Central Board contributing so substantially to its funds, and has the Association been reorganised.

Thanks to Mr. H. C. Lamb and to Mr. A. C. Cramb, in the main, and to others in part, the movement has successfully passed through a very trying and critical period, and everything should now be ready for E.D.A. to become a power to be reckoned with. We wanted money—we have got it. We wanted a new man—we have got him.

But what are we going to do? Are we going to continue to take lying down attacks by a hysterical competitor? Judging from the tone of Alderman Sir Percival Bower's remarks at the annual meeting at the Savoy, that is not his desire or intention in assuming the presidency. Gas has had things far too much its own way in such matters as advertising and speech-making. We are not sure that we need to wait for them "to tread on our coat-tails" any more before something is done about it.

We are in the habit of congratulating ourselves upon the great strides that consumption is making practically everywhere, and all sorts of forecasts are made concerning what may be expected to happen by the year so-and-so. Figures relating to the units used per head in other parts of the world become tiring, but they certainly make our own 256 units look paltry.

Lord Ashfield, in a letter sent to the luncheon (in his absence through illness), quoted such figures in proof of the scope that exists for development. This is, of course, the basis of the present movement.

Sir Percival Bower obviously considers it the duty of the Association to deal with the question of the use of cheap shoddy apparatus, as it is a menace to the industry. As he rightly says, one mishap due to such a cause, and if we may we will add one "black-out" of a district due to failure of supply, will do more harm to the electrical cause than £1,000 of our publicity activity will do good. The co-operation of manufacturers will assist in this connection. Though, as Mr. Lamb remarked last week, the manufacturers are no longer members, "conversations" have taken place with them with regard to future co-operation.

It was pleasing to hear that the response of the electricity supply authorities since the reconstitution had been up to expectations. Seventy-five per cent. of the revenue budgeted for has been promised, and new support is still arriving. What would quickly bring the income up to the 100 per cent. would be a recognition on the part of every electricity undertaking that it derives benefit from the work of the Association and is shirking its duty if it fails to support it.

The atmosphere at the luncheon and annual meeting on Thursday last week was very different from that of the sultry afternoon in July last when reconstitution was the one thing that mattered. Last week between three and four hours were profitably spent in leaving the past behind and dreaming of the great things that the industry now expects from E.D.A.

With Sir Percival Bower as President, Sir William Ray as Executive Chairman, Mr. A. C. Cramb as Director and Secretary, Mr. V. W. Dale as Business Manager, and a staff which knows the ground so well, we ought to be able to use between £50,000 and £100,000 per annum very profitably in advancing the sale of electricity.

Mr. Lamb's Leadership

WE wish to place on record here our own opinion concerning the great debt under which Mr. H. C. Lamb, city electrical engineer and manager of Manchester, has placed the entire electrical industry for the way he has conducted E.D.A. through the critical period of reorganisation. As Mr. C. D. Taite said in effect last week, the Council was most fortunate in having as its chairman at such a time a man of such high administrative experience in electricity supply who knew the problems so well. Mr. Lamb has not only been unstinting in his service at the many meetings involved in making the change, but he has displayed in situations fraught with difficulty a tact and firmness which have been essential in bringing about the successful issue with which practically everybody is satisfied. Mr. Lamb was not slow to

mention the valuable assistance which he had received at all times from Mr. R. S. Downe, the vice-chairman, and from Mr. A. C. Cramb, the Director. It may indicate much if we add that the two names which, either at the luncheon or at the meeting that followed it, were received with general acclamation were those of Lamb and Cramb.

The Future Generation

THE B.E.A.M.A. Education Committee reports a continued reduction last year in the number of overseas students engaged in this country. This is most unfortunate, as the contacts made here and first-hand impression gained of the manufacturing methods in use are important factors in maintaining our position abroad. The absorption of university graduates has also declined and this is causing some concern lest the reserve of scientifically educated trainees should be depleted. The larger concerns that can afford an all-round training are urged by the Committee to take a liberal view in this respect. We see a difficulty here, in that a temporary falling-off of work may result in a reduction in the permanent staff, and the acceptance of trainees in excess of the previous proportion to experienced men may arouse an unjustified suspicion that a firm is attempting to run its works on cheap labour. All manufacturers wish to avoid the odium attached to this suggestion and they know well enough that the salaries paid to senior men in excess of the amounts allowed for apprentices are rarely enough to pay for their greater experience. At the same time, it is hard to get men who, through no fault of their own, have no work to take an objective view of things. Yet the future of the electrical industry depends upon there being a supply of technically trained men with the kind of practical experience that only an up-to-date works can give.

Alchemy

THE modern ability to construct high-voltage apparatus of small dimensions is much more than a demonstration of designers' knowledge of insulation values. It has furnished the means whereby physicists have made such remarkable progress lately in atomic investigations that in themselves provide data for which the electrical engineer will no doubt find a practical use later. Thus, Lord Rutherford in his lecture to the Royal Institution on "The New Hydrogen," *i.e.*, diplogen, a form of hydrogen with twice its atomic weight, used for his bombardment apparatus capable of maintaining a steady potential of 100 kV. Further developments of this kind will depend largely upon the efficacy of research laboratories. This means their financial stability. The reference by Lord Rutherford at the Research Association Conference to the sympathetic attitude of the Government towards this aspect was most gratifying, and research facilities on a much greater scale than before may now be regarded as a probability.

The Poor Man's Publicity

WHEN the report was under consideration at the E.D.A. meeting, Mr. Townley, of West Ham, asked whether more could be done centrally to prepare publicity literature of a kind that would make a more direct appeal to potential consumers in working-class districts, where so many millions of our population have small accommodation. To them much that has been prepared in the past is more or less highbrow. The speaker rightly pointed out that in working for great increases in consumption in the coming years we had to cater for a big demand from a much lower class of consumer than had been responsible for our past success. He was not speaking merely for himself, but for many other engineers who had expressed to him their agreement with his view. The case of this class of consumer demands some local touch from within the area and a knowledge of the kind of argument or demonstration that will convince people placed in widely differing circumstances. How far this kind of thing can be effectively included as part of a local authority's own sales efforts and how far the co-operation of the headquarters staff in London is necessary is a subject which will, no doubt, receive attention. Mr. Townley's observations were certainly received with approval by the meeting.

The Importance of Earthing

THE importance of properly earthing electrical appliances when used near metal normally at earth potential, such as that forming part of a water system, was emphasised by the death of a man engaged in drilling a tank at the home of Sir William Ray, M.P. Energy for the drill was derived from a lamp standard which contained a faulty flex. Had the standard been in use for its proper purpose, the making alive of the metal would have had no untoward results, but the driller, while gripping it with one hand touched the tank with the other, thus receiving a shock. There was no suggestion that the drill was at fault, but it was stated at the inquest that its earth wire had not been connected. This would appear to indicate that the unfortunate man had failed to appreciate that the metal casing of the electrical circuit should have been efficiently earthed at any point within reach.

I.E.E. Papers

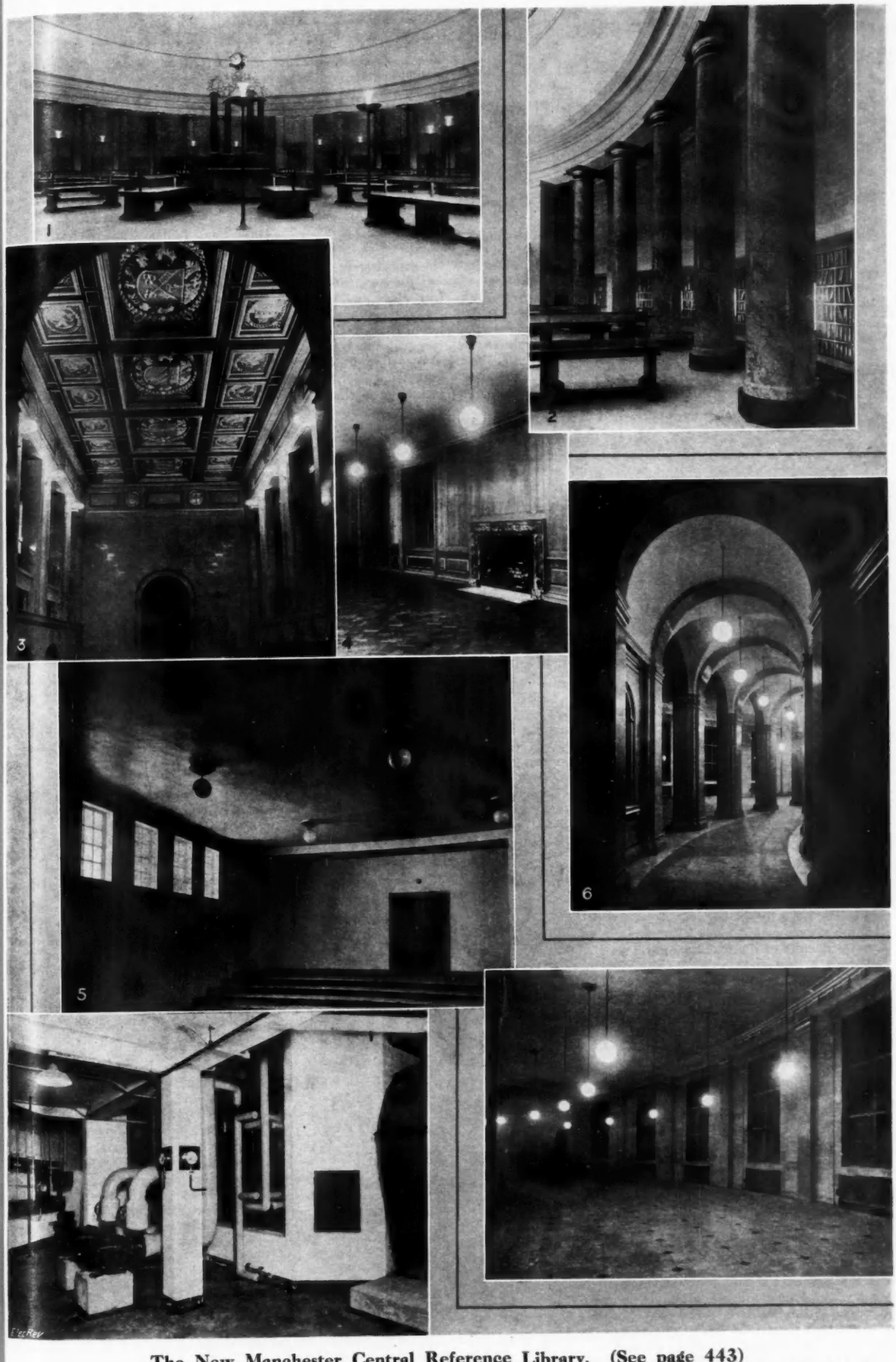
ALTHOUGH there are still a few weeks to run before the present session of the Institution of Electrical Engineers terminates, members who are preparing papers for the first half of next session should have these well in hand by now, as they should reach the Secretary not later than May 31st. The opportunity which the Institution thus provides for giving information regarding advances in electrical science is among its most important duties. The selection of papers entails a good deal of thought and work, and the intervening time is not by any means too long for this to be done properly. Lest it should be thought that this long period keeps the Institution always out of date, let it be remembered that new matters can always be brought up at the informal meetings.

Keep At It

A WELL-KNOWN electrical engineer related the other evening that, while he was on shift in a power station many years ago, a wireman received a seemingly fatal shock at 3 kV. Being well-versed in the method for dealing with such cases advocated on the well-known card of the ELECTRICAL REVIEW, he at once set to work but without apparent result, and the doctor on arrival pronounced life extinct. Nevertheless, he continued his attempts at resuscitation and about half-an-hour later was rewarded by signs of life in the victim. The man, he believed, was alive and well to-day. This incident demonstrates once more the value of the advice in our "Suggestions" to continue artificial respiration methods over an extended period as recovery has often followed even in what first appeared to be the most hopeless cases.

Teaching by "Talkies"

THERE is little doubt that the talking film is a vehicle of propaganda or education (often considered the same thing) of peculiar potency that has been little used by the electrical industry. E.D.A. has one or two films and individual manufacturers have ventured into this field. The difficulty, we suppose, is largely the inability to afford the expense of large halls, or to persuade exhibitors to include propaganda films in their programmes. A solution lies in the use of the small portable projector and 16 mm. film, which can be used in any fair-sized room. The expense of such equipment would not deter progressive supply undertakings if suitable films were available in reasonable numbers. The equipment is available; the films are not. Perhaps one of these days E.D.A. will consider the acquisition of one or more projectors, and the making of half a dozen films for sending round the country. The supply undertakings would not mind paying a reasonable charge which would at least cover the running costs.



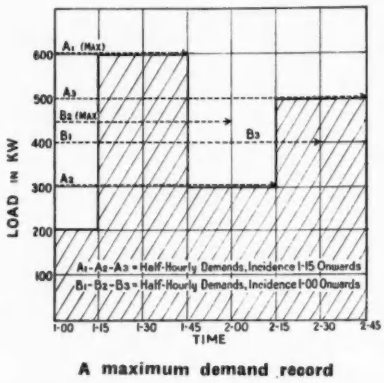
The New Manchester Central Reference Library. **(See page 443)**

1. General (inverted) and local (table) lighting in the Great Hall. 2. Bookshelves in the Great Hall lighted from fittings recessed in the columns. 3. The roof of the Shakespeare Hall illuminated from upward projecting wall fittings. 4. Lighting and supplementary heating in one of the "special" rooms. 5. Artificial daylight from windows in the lecture theatre; ceiling fittings (not illuminated) mounted on inlets from plenum system. 6. An example of corridor lighting. 7. One of the main plenum air-heating and washing chambers; circulating pumps on the left. 8. Some of these lighting fittings are suspended from ventilation inlets; beneath the bronze grilles concealing radiators are the air outlets

Fashions in Metering.

By A. Page, B.Sc., A.M.I.E.E.

EACH industry has its own cycle of fashion stimulated by some radically new method of construction or process which is readily copied but difficult to originate. Electricity metering is no less prone to such whims. Thus, the present vogue for dials is the clock design as specified by B.S.S. The cyclometer dial has been partially eclipsed not because of its inferiority but as a result of prejudice based on adverse experience with obsolete designs; exactly the contrary view is held in most countries abroad where cyclo dials are usual. The cyclometer is more easily read, and as the consumer usually has to pay rent for the meter it is only fair that she should be able to make the maximum use of the instrument, apart from the question of the undertaking's quarterly reading.



A maximum demand record

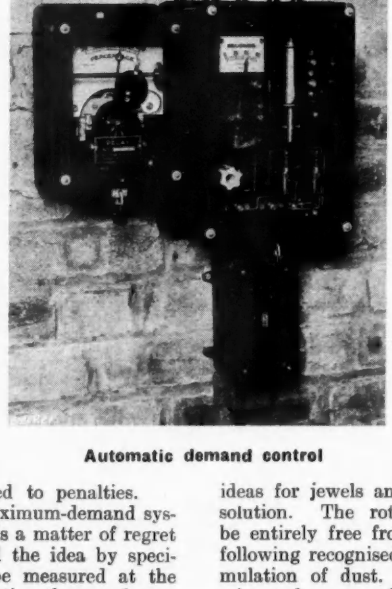
The main difficulty appears to be when the cyclometer ticks over 99999, but this happens (under the worst conditions) only twice per annum and is then only transient. The obvious compromise is not to discard the easily read dial but to introduce a power-driven escapement train.

In the prepayment department combinations of two-part tariffs have provided the test engineer with a galaxy of types to try out. Late in the field has come the triple-coin mechanism, skilful in design but unsound in that if the option is given the consumer of buying 1d., 6d. or 1s. worth of electricity at a time the 1d. will always prevail.

Polyphase Measurement

For polyphase measurement meters have been built on the basis of single-phase elements without considering whether the existing elements in themselves were of a design suitable for application to polyphase work. Some form of pyramiding being essential, the single-phase overall height should have been reduced to the minimum. One manufacturer has already adopted this idea in a meter with elements spaced round one disc, and we are likely to see three-element meters in the future occupying little more vertical space than the present single-phase meters. It means revolving the present magnetic system by 90 deg.

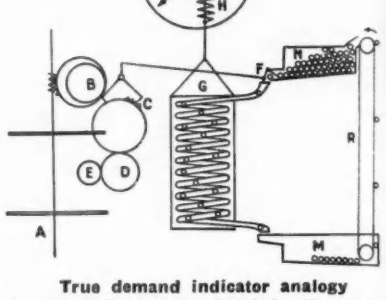
Again power factor and kVA have proved a delight to the technician and a nightmare to the engineer. Tariffs for the layman are already too intricate to permit unfettered expansion in consumption. Would not a more rational way have been to declare a power factor of, say, 0.85 lagging below which one must not connect to the mains without incurring severe penalties? This would enormously relieve the present chaos and the necessity of providing expensive equipments on power consumers' premises. From the saving thus effected could be supported a special staff of "police" meter engineers whose duty would be to inspect by portable apparatus the conditions obtaining on any premises and to ensure that the power factor clause was being observed, defaulters being subjected to penalties.



Automatic demand control

It seems incredible that the existing maximum-demand system should have persisted so long, and it is a matter of regret that the 1926 Act should have entrenched the idea by specifying successive 30-minute intervals to be measured at the hour and at the half-hour. For circumventing the paradox so produced and illustrated by fig. 1 numerous ingenious devices have been introduced, a modern example of which is shown in fig. 2. The left-hand instrument is an ammeter indicating the approximate load at any instant. The second pointer shown can be moved into any preselected position on the scale by means of a micrometer adjustment. When the prevailing load reaches this figure a contact is made completing the circuit of the right-hand time-delay device which can take the form of a synchronous motor. This time delay is also adjustable and should the load be maintained over the prescribed period the two lower no-volt releases connected to motor circuits are tripped. If the load should fall during the time interval, the time delay resets and the cycle must be repeated before load is relieved, but it will be obvious that the time delay can be made zero if so desired. This control was devised by Mr. M. Jennings, M.I.E.E., who has been responsible for a number of such equipments being installed around London.

Fig. 1 illustrates the present position and shows that the maximum demand normally registered may vary on the same load anywhere between lines A or B depending on the incidence of the resetting. If it *is* maximum demand we are out to measure then let it be the true maximum demand and not an indeterminate hybrid. Apart from this, existing methods introduce endless difficulties in securing synchronised demand periods, an entirely unnecessary encumbrance if the correct definition of demand were adhered to. It may be said that no suitable apparatus existed in 1926 for measuring demand on *any* 30-minute time intervals, but neither did much of the actual metering which was eventually developed for grid purposes. It had to be developed.



True demand indicator analogy

A = meter. B = escapement control. C = escapement. D = Motive Drive. E = kWh train. F = release gate. G = suspended cage. H = spring balance. K = demand indicator. L = time delay. M = lower reservoir. N = upper reservoir. R = return path

The fundamentals necessary for securing the true maximum demand are illustrated by fig. 3, and although this diagram is not intended as a practical solution it forms a convenient analogy. The meter releases a quantum representing so many units which remains invariable during the prescribed interval, at the end of which it is rejected. The quanta must maintain an orderly sequence in relation to time, and their total released within the time period is a measure of maximum demand. In the analogy illustrated the meter operating the power-driven escapement train simultaneously releases a ball from an upper reservoir into a path restraining its constant motion for the prescribed interval. At the end of its travel the ball is rejected into a lower container from whence it is returned to the upper reservoir by a magnetic belt driven also by the escapement train. The balls in the restraining path keep their required orderly sequence by reason of the coil, and the maximum demand can be registered either by a differential train between ingoing and outgoing balls or simply by a spring balance graduated in kWh. The basic principles of this arrangement are essentially a large number of quanta per time period, orderly sequence, and sudden entry and release from the measuring system.

It is probable that present methods will be obsolete long before the existing meters are worn out. There will be new ideas for jewels and pivots with, let us hope, a satisfactory solution. The rotating discs, if these are retained, will be entirely free from the train and air-gaps will be vertical following recognised Post Office experience to avoid the accumulation of dust. Also, rectifiers are coming out of the mist and a reversion to d.c. measurement for all supplies, whether for a.c. or otherwise, appears imminent. In that case manufacturers may regret that their present-day designs have been made so durable.

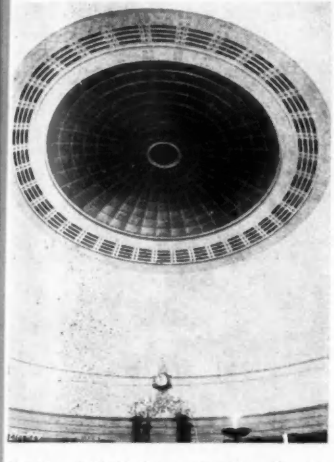
As a final example of the influence of fashion, there was once a vogue, with long-range instruments, which are now almost a household word, for triple, or even quadruple, range over load meters, but a settlement has now been reached at a more moderate figure.

Manchester Central Library

Large-scale thermal storage space heating

THE unusual circular design of the building, with a total capacity of nearly three-and-a-half million cu. ft.; what is believed to be the largest h.v. electrode heating installation in the world; the first very large plenum ventilation system that we have seen operating in conjunction with a thermal-storage system; and the successful solution of many difficult and unusual lighting problems are some of the features of the new municipal Central Library at Manchester which render it of outstanding electrical interest.

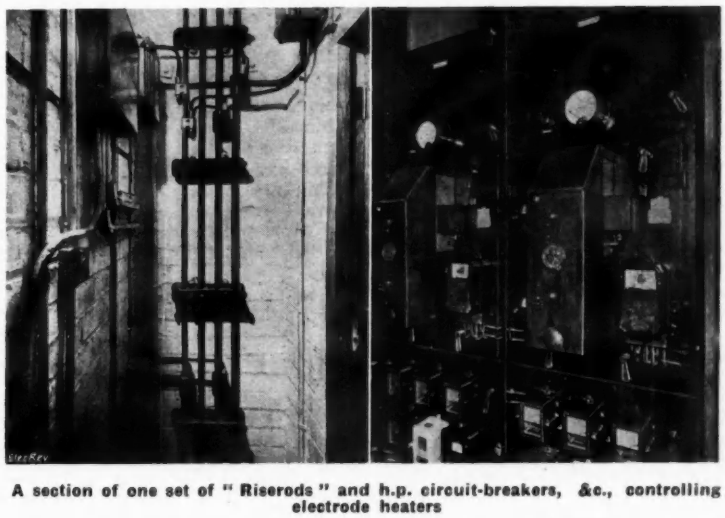
Briefly, the building consists of the Great Hall on the first floor, measuring 127 ft. in diameter, and 60 ft. high at the centre point of the domed roof. Around this hall, rising above its dome, is an annular block measuring 30 ft. from the inner to outer circular walls, which, in its first, second, third and fourth floor accommodates special libraries, rooms and offices. Under the Great Hall the ground floor and basement, each occupying the whole area within the outer wall, accommodate huge book stacks, theatre, &c., while a sub-basement under the main entrance accommodates the heating and ventilating and other engineering equipment.



The Great Hall dome showing the circular grille inlet for the heating and ventilating air

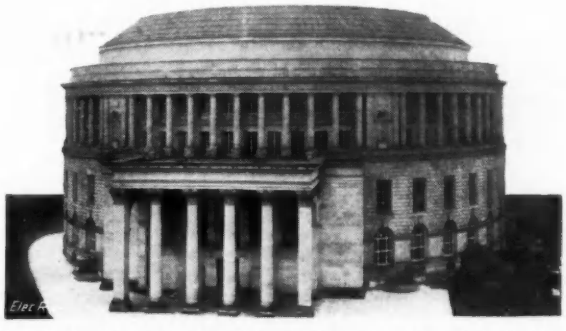
Electricity is received from the Manchester Corporation's 6,600-V, three-phase sub-station on site. Two Ferguson & Pailin h.p. oil circuit-breakers which feed the electrode boilers direct are arranged, with auxiliary equipment, on a separate extension of the supply undertaking's h.p. switchboard, while 230- and 400-V feeders supply the main lighting and power switchboards made by Messrs. Erskine, Heap & Co., Ltd. Each of these has one incoming and four distribution oil circuit-breakers mounted on the front of the metal bus-bar chamber, with underneath connections. Direct from the l.p. board there is a 230-V supply for the electrode motors, relays, &c., of the heating plant.

Main distribution for the lighting is effected by "Riserod" equipment supplied by Messrs. Grierson, Ltd. The riser rods and other electrical equipment pertaining to the general internal distribution is arranged in two sets of vertically disposed chambers, permitting straight vertical cable runs from the basement to the top floor, one set being at the side of each of the staircases at opposite ends of the diameter of the building. Each set consists of four ⅜-in. diameter solid copper rods mounted on a special type of four-way insulator. The phase rods are insulated by a close fitting micanite sleeve, and the neutral rod is left bare. Tappings are taken off on each floor to various lighting fuse boards, and connection to the rod is effected by a special clamp and cable socket which, in the case of the phase connection, is enclosed in a bakelite case.



A section of one set of "Riserods" and h.p. circuit-breakers, &c., controlling electrode heaters

Each set of rods is fed at the basement level by a four-core p.i., l.c. and armoured cable. Immediately above the power switchboard are mounted the power section boards, from which p.i. cables radiate to various distribution boards in different parts of the building. All the cables in the library were supplied by Messrs. Johnson & Phillips, Ltd., and the air-break switchgear and distribution boards by Messrs. Dorman & Smith, Ltd.

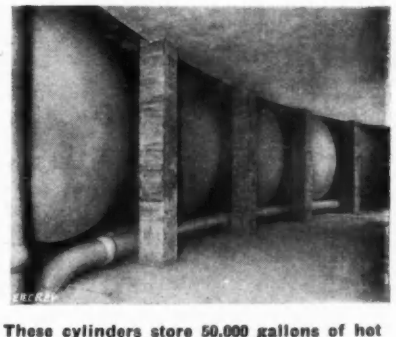


Supply failure is guarded against by a "Keepalite" emergency lighting system, supplied by the Hart Accumulator Co., Ltd., 125 lights at strategical points of the building being wired entirely separately and supplied under emergency conditions only from a 250-Ah battery. A motor-generator set is installed, but the cells are normally trickle charged.

Lighting Problems

The Shakespeare Hall, the main entrance hall, has a very beautifully gilded oak ceiling which is lighted by eight gilded wall fittings each containing six 60-W lamps. These are bracketed about 35 ft. from the floor, and practically the whole of their light is projected upwards.

In the Great Hall indirect general lighting is accomplished by twelve 10-ft. bronze floor standards, on each of which is a bronze dish reflector for upward projection, fitted with one 500-W and three 250-W projector-type lamps. The local lighting is by bronze inverted trough reflectors fixed to the readers' tables, those on the small tables being 7 ft. 6 in. long and fitted with three 40-W lamps, while others 20 ft. long each have eight 40-W lamps. Each lamp is controlled by its own switch in the table top, while the table lighting generally is controlled by master switches at the centre staff counter. Bookcases fitted round the wall in this hall are illuminated by fittings recessed in the columns which surround the wall.



These cylinders store 50,000 gallons of hot water for space heating

Above the aisles between the book stacks reflectors mounted at ceiling level at 1,834 points are of perforated aluminium construction to permit side lighting leakage as well as downward projection. Mr. C. Nowell, chief librarian, to whom we are indebted for permission to visit the library, spoke highly of these rack fittings.

A lecture theatre is illuminated by eight globe units mounted on ventilating inlets at the ceiling, while an "artificial daylight" effect is obtained by concealed lighting behind the windows on either side. The whole of the auditorium lighting is dimmer controlled, and stage lighting and effects are well provided for.

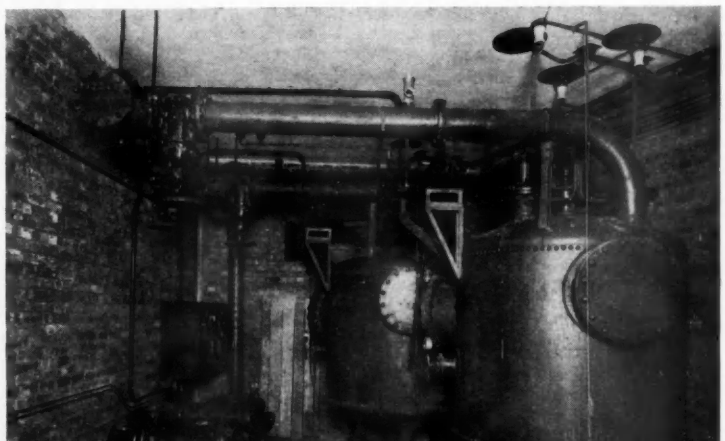
Floodlighting at the second floor level, round the colonnade, is effected by sixty projectors, with a total of 180 lamps. The

administrative portion of the building, committee-room and luncheon-room, &c., are lighted by circular globe units suspended from the ceilings by bronze stems. In addition, there are 231 lighting plug outlets in the building. All the lighting fittings were supplied by Messrs. Falk, Stadelmann & Co., Ltd., and the conduit by Walsall Conduits, Ltd.

Electrode Heating Equipment

The electrode installation comprises two 3,000-kW circulating heaters, each capable of liberating over 10,000,000 B.th.u. per hour. The plan is used in conjunction with a thermal storage system by which 50,000 gallons of water contained in five storage tanks is heated during off-peak hours to a temperature of about 260 deg. F. Each of the three h.p. supply phases terminates in one of the three special electrodes immersed in the water flowing through the heater, heat being generated by the passage of current through the water itself.

The plant is fully automatic, and is primarily controlled by a Venner electrically wound time switch. At the beginning of the "off-peak" period the time switch trips in and starts up the pumps which circulate the water between the heaters and the storage tanks. The automatic pump starters incorporate an interlock contact, so that as soon as the switches have closed (providing the output of the boilers is at minimum) the motor-operated high-pressure circuit-breakers are automatically closed. The output of the boilers is controlled by raising and lowering porcelain shrouds which, in the lowest position, completely surround the electrodes, substantially preventing the passage of current between them. The shrouds are moved by a motor-operated central lead screw from outside the heater, but an emergency hand-operated mechanism is also provided.



The electrode water heaters before being lagged, showing electrode-operating arrangements, circulating pumps, &c.

As soon as the h.p. circuit-breaker is closed an interlock allows the passage of current to the main control relay, and this in turn sets the shroud motor into operation, the output of the heater being gradually increased as the shrouds rise. As soon as the output reaches a predetermined value, a current relay causes the raising motor to stop. The heater then operates normally, and in a short period the temperature of the water in the storage tanks begins to rise. This is, however, accompanied by a decrease in the electrical resistance of the water and a consequent increase in the current flowing in the system. As a result, a second current relay (set somewhat higher than the first) is actuated, and the motor lowers the shrouds until the former current value is reached.

This process continues throughout the heating period, maintaining the output of the heaters substantially constant until, ultimately, either the temperature of the water in the storage tanks reaches the desired maximum, causing the thermostats to break circuit, or, alternatively, the time switch trips out at the end of the heating period. Either of these two operations has the effect of bringing the sleeves into the lowest position, after which the h.p. circuit breaker is automatically tripped. Further, should the current fail the circuit-breaker is tripped, but on resumption of the supply the shrouds are first brought to the minimum position before the breaker can be reclosed. Apart from the two current relays mentioned, the whole plant is controlled from one central relay, no connections whatever being employed.

The electrode heating plant was installed by Messrs. Siemens-Schuckert (Great Britain), Ltd., as part of the contract for the main heating and ventilating system for which Messrs. Saunders & Taylor, Ltd., were responsible. The "boiler" house measures 17 ft. by 27 ft., and provides sufficient accommodation for a third electrode cylinder. There is free access to all the valves, manholes and switchgear.

Warming and Ventilating

The building is heated partly by direct radiators and partly in conjunction with a balanced system of plenum and extract ventilation. The radiators are placed principally on the main outer walls of the building on the various floors, and are sufficient to maintain a moderate temperature during the night hours, when the main plant is shut down. Ordinary exposed radiators are employed for the general offices, while in special rooms radiators are recessed behind bronze and wood grilles. The radiator system is designed to counteract the actual radiation losses.

Warmed and filtered air is delivered throughout the building *via* a system of ducts and sub-ceilings, the fresh air entering rooms at or near the ceiling and the "used" air leaving near the floor level. All the air passed into the building is filtered with a water spray washer to cleanse it thoroughly and maintain a fixed humidity. When conditions permit the air is wholly or partly recirculated, and this allows the temperature of the building to be raised quickly.

The temperature and humidity of the air passed to the building are controlled automatically in the plant room. Thermostatic control is effected by compressed air which is used to keep the heating valves in the correct position, a miniature motor-driven air compressor being installed for this purpose. There are two main plenum and extract systems, each for one half of the main building, while, in addition, a small and similar plant serves the lecture-theatre. Hot water for the radiators and the heaters in the plenum system is obtained from the storage tanks.

Two Kent's water meters show the amount of water passing through the radiators and the plenum heating batteries, respectively, and there is a 24-point electrical indicating thermometer by which the engineer can observe the temperatures at strategical points of the system and building.

Each main plenum fan will deliver 1,500,000 cu. ft. of air per hour, and is driven by a 12-h.p. motor. There are for the main systems two extract fans in the basement for extracting air from the basement, ground and first floors, and two similar fans over the staircases for the second, third and fourth floors. Each basement extract fan has a duty of 900,000 cu. ft. per hour, and is driven by a 7-h.p. motor, and each of the other main extraction units extracts 400,000 cu. ft. per hour. The theatre inlet fan will deliver 500,000 cu. ft. per hour, and the theatre extract fan will deal with 360,000 cu. ft. per hour. The plenum and radiator pumps will deliver 21,000 and 9,000 gal. per hour each, respectively, and the duty of each electrode heater pump is 30,000 gal. per hour. All the pumps are arranged in duplicate, one of each pair being for stand-by.

Other Equipment

A private automatic telephone system with thirty-three points was supplied by Standard Telephones & Cables, Ltd. Thirty-three Synchronome clocks operate on the impulse system from a master clock, and each of the dials of the four-faced clock in the Great Hall has a separate movement, the clock being internally lighted. In staff portions of the building we saw some particularly attractive "Magicoal" fires. Nine 3-kW "Genii" calorifiers serve for heating domestic water in various parts of the building, while in the kitchen cooking and water heating equipment have a total loading of 50 kW.

Throughout the building there are several lifts supplied by Messrs. Etchells, Congdon & Muir, Ltd., and serving the permanent cleaning system there is an eight-stage rotary vacuum pump driven by a 12-h.p. motor, supplied by Messrs. Dodd Bros. The revolving door at the main entrance is driven continuously at low speed by an overhead motor through a clutch which permits under- or over-running of the door.

The complete wiring installation, with the exception of the cabling to the 6,600-V electrode heating system, was carried out by Messrs. Albert E. Sudlow & Co., Ltd., Manchester, who used about 17 miles of conduit and 56 miles of v.i.r. and p.i. cable on the installation. We are indebted to the Manchester Electricity Department, the manufacturers and contractors, and particularly to Mr. H. W. Solly, engineer to the library, for their help in obtaining the above information.

Power Factor and the Grid. By D. J. Bolton

The meaning and effect of the tariff penalty clause

IN a previous article* the costs of bad power factors were briefly reviewed. The cost of the "extra kVA" of demand was expressed as a ratio of the cost per true kW, the ratio rising from about one-third at the power station to three-quarters at the consumer's terminals. Two principal types of power-factor tariff were mentioned, namely that in which the extra kVA is charged for at the full rate, and that in which there is a penalty proportional to the power-factor reduction.

The employment by the Central Electricity Board of the

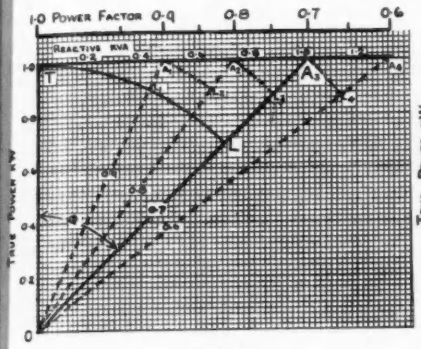


Fig. 1

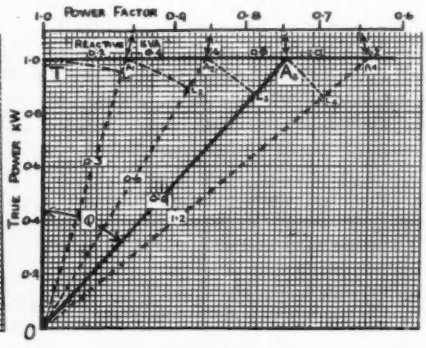


Fig. 2

second of these methods gives a considerable bias in favour of the adoption of a similar method on the part of a distribution authority. If some other method is used, such as a kVA tariff or a bonus/penalty on the whole bill, it can only be made equivalent to the first method on one particular set of conditions (of power factor and load factor). If these change considerably, the undertaking is liable to find itself "landed," and may be subject to a heavier penalty by the Central Board than it is levying on its consumers. The same remarks might apply to an undertaking (having a bonus/penalty on the fixed charge) whose overall power factor rose above 0.85, since the Board grants no bonus for this. Such a case, however, is not likely to arise, and there is no objection to an undertaking giving a bonus to individual consumers for high power factors (even above 0.85) provided it is receiving extra for the low power factors, and provided that its *overall* power factor does not exceed 0.85. For all power-factor improvements up to this point, it is immaterial whether the 4s. 6d. per kW—the C.E.B. figure—be regarded as an added bonus or as a reduced penalty.

In comparing the incidence of a bonus/penalty power-factor clause with that of a plain kVA tariff, it will be assumed that the bonus/penalty applies to the fixed portion only of a two-part tariff, as in the case of the "grid" tariff cited above. Otherwise it will evidently be impossible to make a direct numerical comparison with the two-part kVA tariff. (Only the fixed charge will be brought into consideration, the kWh charge being assumed the same for all.) It will also be assumed, for the moment, that the magnitude of the bonus/penalty as a ratio of the initial fixed charge is the same as the magnitude of the power-factor change as a ratio of unity power factor. This is the same as saying that a change in power factor of 0.01 involves a 1 per cent. change in the initial fixed charge. This may be described as a "100 per cent." bonus/penalty clause. In the case of the "grid" tariff, the penalty ratio is 4s. 6d. divided by £3=0.075 for a 0.1 fall in power factor, which is therefore a 75 per cent. penalty clause.

A Comparison of Types

With these assumptions the relationship between the two types of power-factor tariff is easily established. In Fig. 1, OA represents the magnitude and direction of the actual kVA at the time of maximum demand, lagging by an angle ϕ behind the true power direction OT. (Attention, for the moment, should be devoted to the full lines and large initials in the diagram.) For simplicity let the true power component OT have a constant value of 1 kW and let k kVA be the magnitude of the actual demand OA and p the power factor at this instant. Then $p=\cos\phi=\mathrm{OT}/\mathrm{OA}=1/\mathrm{OA}=1/k$. Let p increase by a small amount δp, and let δk be the corresponding change in k. Then $\delta k=\delta p\times dk/dp=\delta p\times 1/-p^2=-\delta p/\cos^2\phi$. In words, when the angle of lag increases, the increase in kVA (for 1 kW true power) equals the decrease in power factor divided by the square of the power factor or the square of cos ϕ. It follows that the extra kVA resulting from a given power-factor decrease becomes greater as the power factor gets less.

At unity, a drop in power factor of 0.1 will increase the demand by approximately 0.1 kVA for each 1 kW of true power. At 0.85 power factor a drop of 0.1 increases the demand by $0.1/0.085^2=0.138$ kVA. At 0.7 power factor a drop of 0.1 increases it by 0.204 kVA, and so on.

Referring to the figure, as ϕ increases and OA swings round to the right, the length of OA (*i.e.*, the actual kVA demand) increases at a greater rate than cos ϕ decreases. A power-factor scale is shown at the top, and the four radii OA are drawn for equal differences of power factor. By drawing arcs from each point A to the next radius it is easy to see that the lengths L_1 A_1, L_2 A_2 are getting greater.

It follows that the two types of tariff are not in a fixed ratio to each other but vary according to the particular consumer's power factor. This can be seen by comparing a kVA tariff with a "100 per cent." bonus/penalty tariff of the same initial magnitude. Thus compare two tariffs, one which charges £10 per kVA and the other which charges £10 per kW with a penalty of £1 (*i.e.*, 1/10th of the fixed charge) for each 0.1 by which the power factor falls below unity. (N.B.—The point selected for the median power factor does not affect the question. A tariff of £10 per kW with £1 penalty per 0.1 for all power-factors below unity is exactly the same as a tariff of £11 with a bonus/penalty for power factors above or below 0.9, or a tariff of £12 with a bonus/penalty centred round 0.8.)

Inducement to Improve

At power factors bordering on unity the two tariffs will charge the same, for at this point the change in kVA is numerically equal to the change in power factor. At power factors about 0.85 a change of 0.1 will make (for each 1 kW of load) a difference in the kVA tariff of £1.38 and at power factors about 0.7 the same change will make a difference of £2.04, whereas in the second tariff the difference will always be £1 at all points. Hence a very bad power-factor consumer will have greater inducement to improvement on the kVA tariff.

In the case of the "grid" tariff which has a 75 per cent. penalty clause it will be seen that at power factors in the neighbourhood of 0.85 the charge made for the extra kVA due to falling power factors is $0.75\times0.85^2=0.54$ times as much as the charge per kW. At power factors of 0.7 it is $0.75\times0.7^2=0.34$ times as much: extra kVA at this point will cost one-third as much as true kW.

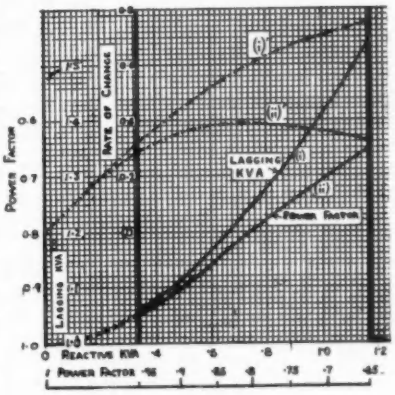


Fig. 3

These figures are very much what were anticipated from a consideration of generation costs, to which must be added (in the case of the "grid" tariff) the effect of the lagging demands on the cost of the load sharing apparatus. They can easily be visualised from the diagram in fig. 1. If the power factor falls from 0.7 to 0.6, *i.e.*, from A_3 to A_4—the penalty is 4s. 6d. The additional kVA which results is represented by the distance L_1 A_4, and equals 0.24 kVA when OT=1 kW. Since the fixed charge is £3 the penalty here is at the rate of $4.5/0.24\times3\times20=0.31$ of the price per kW. The same penalty is charged for the drop in power factor from 0.85 to 0.75, and in this case the extra kVA is only 0.15 so that the price per kVA is correspondingly larger.

Comparing this with the power factor clause for selected stations,† when the owner of such a station purchases supplies from it, the fixed kW charge is multiplied by $\frac{0.8+0.2/B}{0.8+0.2/A}$ +0.2/A when B is his power factor and A the power factor of

* ELECTRICAL REVIEW, February 23rd, 1934.

† Order 1016, 1929, Electricity Commission.

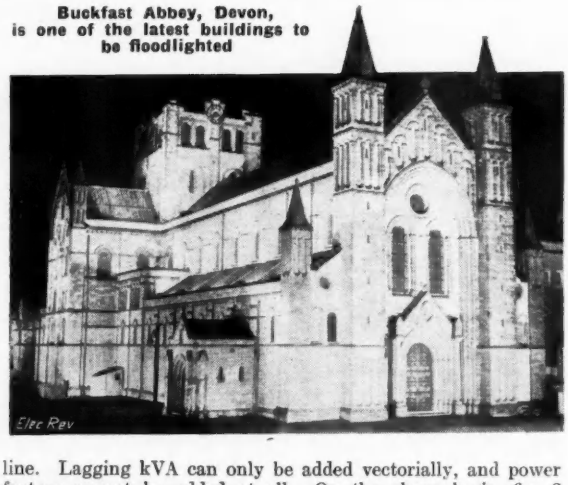
the station. In other words, four-fifths of the fixed charge is independent of power factor and the remainder is proportional to kVA, so that extra kVA are charged for at 0.2 of the price per kW. But this calculation makes no allowance for diversity, and since A and B are not metered simultaneously the charge per extra kVA *falling on the station* is higher than this.

General Treatment

The above is a comparison between two types of tariff but these two by no means exhaust the possibilities of power-factor charging. This may be seen by referring again to fig. 1, the length OT being regarded as unity or 1 kW as before. As the line OA swings round and the angle of lag ϕ increases, there are three important quantities all changing with it. These are as follows:—(i) The lagging kVA ($OA=1/\cos\phi$) from which the "extra kVA" (LA) can be obtained by subtracting one. (ii) The power factor ($\cos\phi$). (iii) The reactive kVA ($TA=\tan\phi$). In examining their various rates of change, either the angle ϕ or else one of the other three quantities could be selected to serve as the independent variable, to which each of the others could then be related. The angle of lag itself is more of a mathematical conception than a practical basis for power-factor charging. It may conveniently be forgotten, thus leaving the three variables listed above.

In the following treatment the reactive kVA (iii) has been made the independent variable, and the other two have been related to it. Reactive kVA has several advantages as a basis. In the first place it appears to be a somewhat more tangible entity, and one more simply measurable than either phase angle or power factor. In the second place it forms a more logical basis of charge. Both a *power* current and a *magnetising* current are needed in order to operate most electrical plant, and both may reasonably be charged for. In the third place the reactive kVA of different consumers (if simultaneous) can be added numerically to give the total reactive kVA on the

Buckfast Abbey, Devon, is one of the latest buildings to be floodlighted



line. Lagging kVA can only be added vectorially, and power factors cannot be added at all. On the above basis, fig. 2 shows the same quantities as fig. 1 but drawn for equal increments of tan ϕ instead of cos ϕ. It will be noticed that the extra kVA $L_1 A_1$, $L_2 A_2$, etc., become progressively greater as the lag increases, but not so much as in fig. 1.

The same point is illustrated in the lower part of fig. 3. This figure is drawn to a base scale which is equally divided in reactive kVA, and a power-factor scale is also shown along the base line. The full portions of the curves are drawn over what may be called the useful working range of power factor, namely, from 0.95 to 0.65. Curve (i) plots the lagging kVA (for 1 kW load) and curve (ii) plots the power factor to a reversed scale. These numbers correspond to those given above, the base of the curves being the quantity (iii). The two curves coincide at unity power factor, but over the useful range curve (i) becomes progressively steeper whilst curve (ii) remains almost straight. Over this range the reduction in power factor is very nearly proportional to the increase in reactive kVA, the power-factor change being approximately one-third of the change in reactive kVA per kW of load.

This last point is more clearly shown in the upper chain-dotted curves of fig. 3, which plot the slopes or rates of change of the lower curves. Curve (i)′ goes up from 0.3 to 0.75 whilst curev (ii)″ only varies from 0.3 to 0.38 with an average of about 0.33.* This leads to the very important conclusion that *over the normal range* of power-factor variation a bonus/penalty method of charging corresponds very closely with a flat rate per reactive kVA. In figures, a 100 per cent. power-factor penalty is equivalent to a 33 per cent. levy on reactive kVA. The same thing can be seen in fig. 2 where the points A_1, A_2, A_3 and A_4 are drawn for equal increments of 0.3 reactive kVA. They correspond fairly nearly to the power factors 0.95, 0.85, 0.75 and 0.65 (i.e., to power-factor decrements of 0.1) as is shown by the arrow-headed connecting lines.

The "grid" tariff can then be related to reactive kVA by saying that 4s. 6d. for 0.1 power-factor reduction (per 1 kW true power) is equivalent to approximately 4s. 6d./3=1s. 6d. per 0.1 reactive kVA=15s. per reactive kVA. Reactive kVA are therefore charged for at 15/60=one-quarter the price of true kW.

It will be clear from the foregoing that there is a third way of charging for power factor—in many ways more scientific although rarely practised—namely, to charge according to the amount of magnetising current or reactive kVA drawn from the line, and represented in figs. 1 and 2 by the distances TA. The three methods may then be summarised as follows:—(i) charging for the extra kVA of demand (distances LA). (ii) Charging for the reduction in power factor (horizontal scale TA). (iii) Charging for the reactive kVA (distances TA).

Approximating Costs

It cannot be said that any one of these three exactly represents the supply costs resulting from bad power factors. The first of them represents the costs of the extra copper sections necessary to carry the lagging currents, whilst the third represents the costs of the phase improvement plant necessary to restore the power factor. This third one is rarely employed, but the second gives very similar results over the working range. One or other of them is certainly fairer than the first method as between different consumers connected to the same point in the system. For, regarding the system power factor as fixed for the moment at some particular value, the harm done by different consumers will be in proportion to the reactive kVA which they severally draw from the line.

Yet comparing two consumers working at points A_1 and A_4, a given reactive kVA at A_4 will add far more to the demand kVA (and therefore far more to the bill, on tariff (1)) than the same reactive kVA at A_1. In a similar way, on this tariff, the inducement to install condensers is far greater to a consumer at point A_4 than at A_1 although the effect on the system of a given condenser is the same for both. The above assumes that points A_1 and A_4 represent small consumers in proximity on a large system, so that their effects merge into the whole. If they were large consumers on separate distribution lines the position would be quite different.

The Incidence of Maximum Demand

Another defect in tariff (i) is that it gives the consumers no credit for what may be called their "phase diversity." This may be explained by saying that even if all the individual maximum demands occurred simultaneously the sum of their kVA's would still be greater than the kVA demand on the station. This fact follows from the varying angles of lag of the different consumers, so that whilst their true powers and their reactive components add numerically, their actual kVA demands only add vectorially. The magnitude of this effect can be seen by considering two consumers whose loads lag 30 deg. and 60 deg. respectively, connected to a system whose mean angle of lag is 45 deg. (approx. 70 per cent. power factor).

If each customer has an m.d. of 100 kVA and if they occur together the m.d. on the system will be not 200 but 193 kVA. The difference may not seem great in proportion to the whole power, but since it only comes in when kVA are charged for instead of kW, its incidence is entirely on the extra kVA (LA on figures 1 and 2), and in proportion to this it is quite an appreciable amount. If the correct price for these extra kVA had been estimated to be 75 per cent of the price of true kW, the diversity in the case cited above would reduce the correct price to 67 per cent.

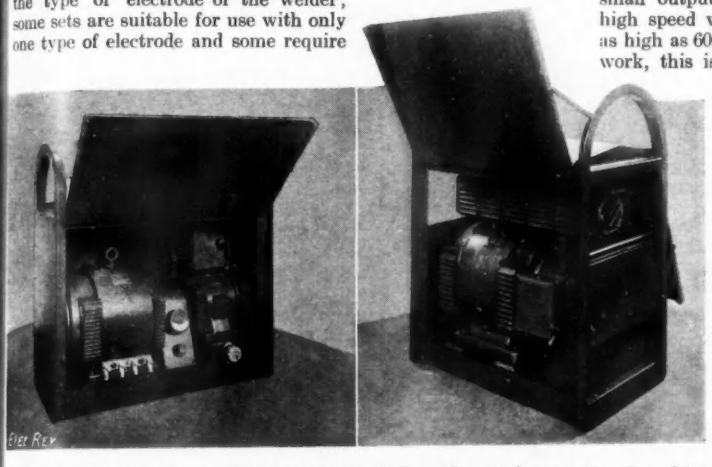
The final conclusion is that a bonus/penalty tariff is technically preferable to a kVA tariff because the penalty can be made of any desired magnitude, and because its incidence is, in general, a closer approximation to the costs. In the case of generation or bulk supply charges, a plain kVA tariff represents an excessive over-penalisation of low power factor, and it was no doubt for this reason that a power-factor penalty was employed in the "grid" tariff. Another way of getting over this difficulty would have been to have employed a differential kVA tariff—*i.e.*, to charge the extra kVA not at the full rate but at some fraction of the rate charged for true kW. For example, the "grid" tariff could have charged £3 per kW plus £1 per extra kVA, and this would have given the same results in the region of 0.7 power factor as the penalty actually employed. The tariff would then have been expressed in the form "£2 per kW plus £1 per (total) kVA." The advantages of a plain kVA tariff are its simplicity and the fact that for low-voltage supplies from a distribution undertaking it gives a fair approximation to actual costs.

* Mathetically, the rate-of-change of (i) with (iii), which is represented by (i)′ equals sin ϕ. The rate-of-change of (ii) with (iii), represented by (ii)″, equals sin $\phi \cos^2\phi$, and this function is almost constant over this particular range of ϕ.

Electric Welding Sets. By Thomas E. Berry

Their application, characteristics, and design

THERE are many varieties of small-output welding sets on the market all of which may seem to the inexperienced buyer to offer good welding possibilities. When considering the purchase of a general-purpose a.c.-d.c. set one should be chosen which suits all types of electrodes and is easy to weld with. Circumstances may demand a change of the type of electrode or the welder; some sets are suitable for use with only one type of electrode and some require constant skill in operation, causing too much reliance to be placed on the welder.



Left: A two-operator set. Right: A single shaft motor and generator for shipyard use

Most of these sets have a drooping characteristic and either produce a peak striking voltage or have an open-circuit voltage of about 70. The usual outputs are either 25/200 or 50/250 A, and the controllers are calibrated for their current stop ratings on a basis of 25 arc volts. The necessity for studying the arc voltage at the requisite set output is not always appreciated; a set may give 250 A at 25 arc volts, but the output may drop to 200 A if an arc voltage of 40 is required, from which it will be seen that the class of work and the type of electrode used determines the output to a large extent. With regard to stability, it is necessary to visualise the welding operation, in which the operator strikes an arc of a length determined on the one hand by his own ideas and on the other by the requirements of the electrode. As a short arc is required so as to produce less "blow" and to give the flux a better chance to shield the arc and prevent oxidisation, the set must be capable of giving a short arc and of maintaining it easily under welding conditions.

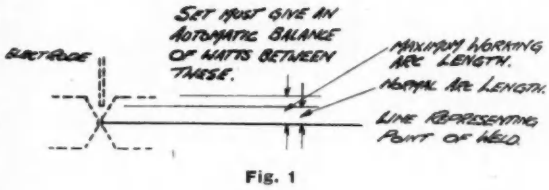

SET MUST GIVE AN AUTOMATIC BALANCE OF WATTS BETWEEN THESE.
ELECTRODE
MAXIMUM WORKING ARC LENGTH.
NORMAL ARC LENGTH.
LINE REPRESENTING POINT OF WELD.

Fig. 1

It is impossible to compensate exactly for the burning of the electrode while retaining the same arc length throughout the run; when this is coupled with the variety of length a welder may use, the condition indicated in fig. 1 arises; this diagram shows that, within the limits set by the minimum and maximum arc length, there should not be too great a variation in the output on any particular regulator step. Electrodes which do not require exact current values should be chosen in conjunction with a set which has a steep characteristic to provide the ideal welding combination. Close regulation is essential, but often sets are provided with comparatively coarse regulation, which tends to place many difficulties in the way of good welding.

A modern design of a single shaft motor-generator with an output of 50 to 250 A at 25 arc volts at the maximum range is illustrated. The cover was designed for shipyard use to permit of easy slinging and to be as nearly as possible weatherproof. In this case the regulation is in the form of single-knob control incorporating fine and coarse adjustment.

Drooping-characteristic Sets

The drooping-characteristic type of welder is suitable for small outputs only. Should the work done permit of very high speed welding all the time, the output could be placed as high as 600 A, but if, as often happens, there is a variety of work, this is not the kind to use. Should the welding current be 150 A, one welder only can be employed, whereas with the level-voltage type of set three welders could be employed with obvious advantages. By limiting the output of a single operator set to 250 A moderately high speed welding as well as finer work can be done without excessive waste of output capacity.

With sets of larger capacities we have a more difficult problem to face—that of load factor. As with the smaller sets, we must study the class of welding to be done and arrive, by applying diversity factor, at the type of set required.

I think it would be as well at this stage to define the terms "diversity factor" and "load factor." By diversity factor I mean the figure representing the diversity of load due to all the men not actually welding during the whole of the day; some time is expended in the preparation of work. It is applied thus:

$$\frac{\text{Set output}}{\text{Diversity factor}} \quad \frac{\text{Average amperes per operator}}{} = \text{Number of welders who can be employed.}$$

Load factor is the definite product of a multiple, whereas diversity factor can only be an average and, as such, changes with the particular conditions. The former should be 100 per cent., the latter varies between 0.3 and 0.8, depending upon the type of set and the average amperes per welder.

Fig. 2 relates diversity factor to the number of welders one might expect to employ on six sizes of sets. For this curve the average time a welder is actually welding during a full day has to be assumed for a particular condition; here we have taken shipyard work, the average being 33⅓ per cent. This figure has not been retained throughout as we have to consider the loading on the set when the welders are working at the higher currents. The meaning of this is clear if we take the case of three operators using 200 A each; the maximum and minimum conditions occur when all three are in step, requiring a continuous output of 600 A, whereas when they are all out of step, the continuous output is only 200 A. The diversity factor in this case is taken at 0.75 and the continuous output would be 450 A.

Fig. 3 indicates the difference between the diversity factors used for fig. 2 and a constant load factor with 50, 100 and 200 A per operator. It is impossible to say exactly how many welders can be employed on the larger sets; full use of them

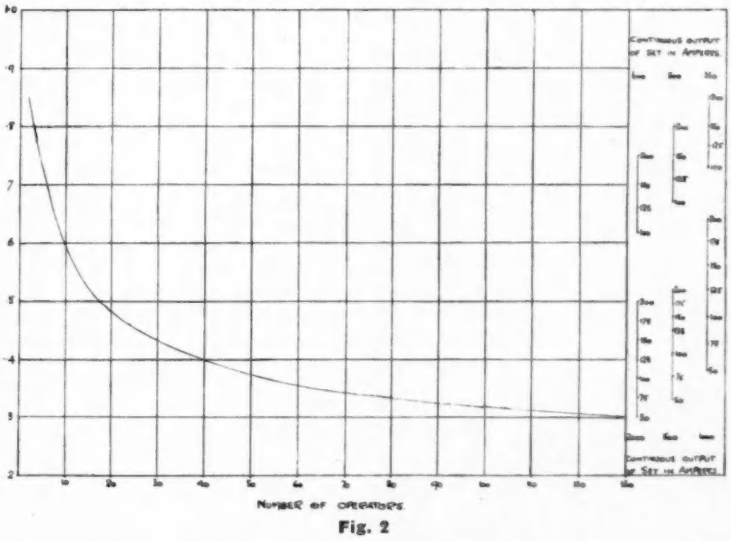


Fig. 2

can be made only by working to the maximum temperature rise of the generator, adding to or taking off welders as the temperature falls or rises in relation to the normal. The advantage of this is that the set can be overloaded quite considerably until the temperature rises to normal and further that when a variety of work is being done any changes in the total output can be compensated for.

The two-operator set illustrated gives a terminal voltage that is variable between 50 and 60 V, whilst the generator has a continuous rating of 400 A. A positive bus-bar, permitting the connecting of four welders when fine welding is being done, is provided on one side and a negative bus-bar on the other.

Each welder has a regulator, which permits variations between 25 and 200 A. This is compact to enable it to be taken into confined positions, and it can be used outdoors as means have been taken to prevent internal damage by foreign matter dropping through the open portion of the top cover. For high-speed welding the two regulators are coupled together to supply one operator with 400 A.

Immediately we depart from the true single-operator set the drooping characteristic must give place to a constant-voltage characteristic. In deciding the voltage we must consider, first, the value required at the arc for striking, secondly, the displacement of the set in relation to the work, and, thirdly, the effect of the chosen voltage on the size of the set.

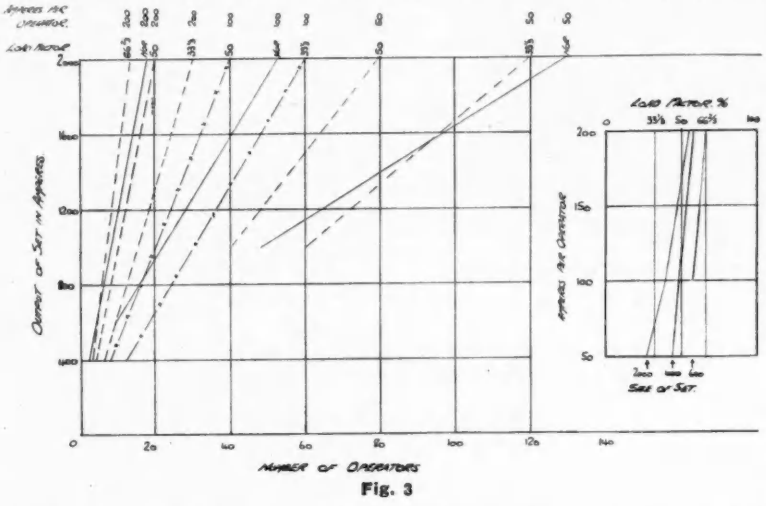
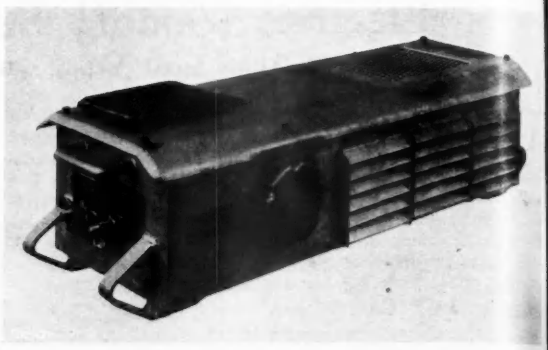


Fig. 3

At one time it was thought necessary to have 70 V to strike an arc, but while there is still no hard and fast rule to apply to all conditions, it has been found possible to use as low as 35 V. The correct value is determined to some extent by the class of welding to be done; the arc voltage may be any figure between 15 and 35, according to the type of electrode used. The difference, too, in striking an arc inside a workshop and outside must be taken into account; a safe assumption is that a figure between 50 and 60 V would meet these conditions.



A regulator for a two-operator welding set

The displacement of the set has a bearing on the voltage available for striking, in that the voltage drop may be excessive if the welding points are a long distance from the set, and insufficient copper is provided in the bus-bars or distributing cable; the voltage variation proposed should cover all reasonable cases of this kind.

The objection to a set with voltage variation is that, assuming the worst conditions, it must be designed to give its rated output at the maximum value. Therefore, at the minimum value, the output would be below that obtainable from the same frame size if designed for the lower voltage only, which means that the cost of providing a variation can be a waste of capital. It would be better to arrange the normal maximum value at 55 V with a working figure of 50 V and design the set to give its output at 50 V, with a slight reduction of current at 55 V and a greater in proportion at 60 V.

One variable which has a direct bearing on the cost of a set, and at the same time complicates the design and satisfactory running is the question of speed. The old ideas of d.c. generator design indicated the advisability of a slow speed to avoid commutation troubles with heavy currents and to provide for long life. Electroplating generators have been built to give up to 3,000 A; these furnish useful particulars for determining the design of commutator and brush gear for welding generators, but they cannot be directly applied.

I am indebted to Messrs. J. H. Holmes & Co., Ltd., and Smith's Dock Co. (South Bank) for the illustrations.

A French Rural Tariff

IN many parts of France a power company supplies electricity and operates the local low-voltage network, which often belongs to the individual village or a group of villages; a small surtax per kWh sold covers the capital charges. This combination of outside private enterprise with communal ownership is found to be successful in practice and to tend towards the elimination of many difficulties. The cost of energy for lighting is usually lower, and for small power somewhat higher, than in England.

A system of tariffs introduced by Messrs. E. Bastide and E. Breucond in the Upper Tarn Valley, South-West France, has as its object the stimulating of loads other than lighting, which previous methods of charging had failed to do. Consumers are opposed to fixed annual charges (whether for a minimum consumption or otherwise) and to paying hire charges for more than one meter.

It was decided that a tariff for rural areas must be simple, flexible, and easily understood, and should create the opinion that the greater the consumption the lower the price.

The block tariff adopted comprises three stages. Meters are read quarterly, but to simplify accountancy the stages are settled annually. The problem was to find a formula that would indicate in advance the nature of the consumption for various purposes of any given consumer. Neither floor area, nor acreage, nor the number of animals have proved suitable factors in a tariff, and a basis of the number of rooms lighted had the disadvantage of discouraging the installation of lighting points in rooms but little used.

A test was made in one village for a year, meters being placed in several rooms of fifteen buildings; the results obtained were confirmed in a village with 200 consumers where the results of a test were examined during a period of three years. The 200 consumers included eighty small agriculturalists, ninety medium holders, twelve owners of large farms, twelve artisans, and four persons with private means. Further investigations were made in 120 parishes in the Department of Aveyron. It was found that the amount of electricity used for lighting depended materially on the type of room, and a "room coefficient" was obtained from the annual consumption of each class.

The following lighting consumption points have been adopted: Kitchen, 25; parlours and offices, 10; first two bedrooms, 8; other bedrooms, 4; exterior lamps, 5; cattle stalls, for each 30 sq. yds., 5; other stalls, 5; shed space, 3. Where a radio set is in use the lighting indicator is advanced by 20, as the residents stay up late to listen in.

The first tariff stage is fixed at the nearest ten points to the total, the second stage allows a reduction of 50 per cent. and is taken as from sixty to eighty hours' use of the motor; where no motor is installed this stage is very small. The third stage is 25 per cent. of the lighting rate. This single-meter system is not applicable to home workshops, factories, or in commercial establishments.

Local experience with cookers showed that the oven should have a 1,000-W loading and that 1,600-W hot-plates would be suitable, one with an insulated bell cover and the other a surface plate for rapid heating. A current limiter is used to restrict the demand to 3,500 W.

MEETINGS AND DISCUSSIONS

Current Topics and Opinions Expressed at the Institutions

Automatic Long-distance Telephone Switching

THE paper in which Mr. T. S. Skillman describes recent developments in the switching of long-distance telephone circuits (to which we made reference last week) was discussed at the INSTITUTION OF ELECTRICAL ENGINEERS in London on March 22nd.

Mr. W. H. Grinsted pointed out that the paper contained an account of new methods, but did not indicate the circumstances in which they should be introduced. It was questionable whether general subscriber-to-subscriber dialling could be permitted over distances greater than fifty miles, for this involved very complicated metering arrangements with the present system of charging, and the method of impulsing would also necessitate some means of regeneration or correction. Circuit occupancy could be very largely increased by admitting slight delays. The ideal would be for the demand operator who originally accepted a call to see it through, as was now done on the Cape Town system.

The red, blue and green neon sign recently erected on the façade of the Trocadero Cinema, New Kent Road, London, is a Claude-General production

Mr. F. Gill remarked that if one looked sufficiently ahead one would see that long-distance dialling would have to be introduced because of the need to make better use of trunk circuits. Therefore the paper was important, especially as it did not represent a battle of systems, but an effort at co-operation. The confusion which would arise from the use of different methods of operation on different lines must be avoided, otherwise when through connections were made a signal would have different meanings along different sections of the circuit. This aspect of the subject was receiving the attention of the C.C.I.

Mr. J. Hedley agreed with Mr. Grinsted's remarks on the metering difficulties that would result from an extension of subscriber dialling. The subject had been seriously considered by the Post Office and a standard supervision programme was now being framed. For long-distance machine switching it was desirable to decide early whether dialling or key-sending should be used. With key-sending some form of impulse storage and translation was necessary and it would have a number of advantages at the incoming end at any rate.

Mr. J. A. Mason instanced, as an example of metering complications, a London-Liverpool call which would necessitate fifty-four metering operations requiring twenty seconds to complete every three minutes. He said that personal calls would cause difficulties, since the minimum fee would be charged whoever answered the call. He suggested that frequencies outside the speech band might be explored with a view to avoiding interference with speech.

Pulses and Continuous Tones

Mr. H. J. Gregory pointed out that the author's two-frequency system used pulses while the Post Office's employed continuous tones, which was simpler and required only about half the number of relays. The author's summary of permissible frequency sending levels was misleading. Pulses would cause more interference than continuous tones and he would rather modify echo-suppressors by introducing two tuned circuits than complicate all the signalling equipment by using impulse tones.

Mr. T. H. Flower maintained that some of the objections to the original four-frequency method would still apply to the author's two-frequency system. A dialling receiver employing an overloaded guard valve would not be unaffected by surges as the author suggested. His reference to the guard device as novel was hardly correct, since it had been patented and was known to the G.P.O. Capt. J. G. Hines said that co-operation was required not only between designers of circuits, but also between those who operated the lines, since there was a tendency to exploit lines by adding to them signals which transmission engineers did not look upon with favour.

Mr. T. S. Skillman, in a brief reply, repeated that his chief interest was the reduction of operating time rather than long-distance subscriber-to-subscriber dialling, which would, however, be introduced in the future. He was pleased to hear his plea for standardisation backed up as a means of introducing uniformity of practice without hampering development.

Lighting in Architectural Design

IN the course of a paper entitled "The Aesthetic of Electric Lighting," read before the ILLUMINATING ENGINEERING SOCIETY in London on March 13th, Mr. R. O. Sutherland said that utility necessitated the inclusion of artificial lighting in a building; by this the lighting became an actual part of architectural design and was subject to the same rules. Harmony of expression could only exist when there was harmony of purpose. Development in this direction should bear an air of forethought.

Ingenuity in craftsmanship or mere rearrangement of accepted lighting forms were not sufficient alone to support development indefinitely. There was danger in trying to fix a contemporary architectural style; such a style was not apparent until many years later. What were considered as period designs now did not exist as such at the time of their evolution, and to think of lighting to modern style is no more progressive than lighting to period style.

The significance of the description "built in or on" was that architectural lighting should be visualised and preconceived before starting upon a design. The fact that architectural lighting was an integral part of the building implied the shouldering of responsibilities in common with concrete and steel, both scientifically and æsthetically.

It was necessary in most cases to have a basis of light, an overall illumination sufficient for general purposes, which would vary in foot-candles according to the type of building. As a rule it was obtained by the totally indirect method and was needed to restrain contrast from being too violent. Unrelieved basic light was correctly used where the values of daylight factors to a composition were not fundamentally altered by artificial light. Designs dependent chiefly upon colour or perspective would not be suited to overall washes of diffused light, as colour values would be altered and perspective liable to be flattened. Decorative lighting employed various features grouped round a dominant feature in ordered relation of accent, such accent being obtained by studied contrasts in areas of surface brightnesses. No luminous or illuminated surface should be permissible which was meaningless; the introduction of an extra lighting motif would have the result of upsetting the æsthetic atmosphere.

Fantasy lighting introduced atmospheres of gaiety, novelty, &c., by means of colour combined with novel design. They were used to draw attention or to break up large

A good example of architectural lighting—the O.C.E.L. premises in Paris

plain expanses; lines conveyed illusions, radial notation focused attention, and repetitive curves imparted rhythm.

In design, direction or diffusion was a vital consideration and raised the engineering aspect. The more simple the fitting the greater was its scope of application. It was almost impossible to assess a fitting in terms of æsthetic value for architectural lighting until it became an integral part of a structure.

Poor results were often obtained through a designer using lamps in a feature of too small a scale, thereby causing spottiness, glare, and over-heating, with resulting discoloration, all of which were contrary to true æsthetic sense. Dirt, as well as being the enemy of the engineer, was equally disliked by the architect. No designer made provision for defacement by dirt; it was of paramount importance that in order to convey sense of inspiration a lighting scheme should be preserved as far as possible in all the purity of its original texture and colour.

Architects on the whole were not happy with illumination terms. Lumens and foot-candles did not convey any accurate mental picture of lighting intensities or tones in architectural lighting. There seemed to be need of a volume measurement; the description of a room brimful of light, or a shallow amount of light, it was contended, conveyed a better architectural impression of the lighting content than so many foot-candles on a plane, or a statement of the total wattage. Even experienced illuminating engineers were themselves sometimes deceived when estimating intensities.

A Proposed Standard Wayleave Agreement

MR. J. A. SUMNER read his paper on "Wayleaves and Procedure" (see our last issue, p. 414) at a meeting of the OVERHEAD LINES ASSOCIATION on March 21st, when Major T. Rich (President) commented on the long delays in getting supply into rural areas owing to the present procedure in obtaining wayleaves, and complained of the manner in which certain sections of the daily Press were agitating for electricity at very low rates irrespective of the density of population. The public was thus being led to think that in sparsely populated districts electricity could be supplied at the same low rates as were possible in densely populated areas.

Mr. E. G. H. Maddy (National Farmers' Union) said that the tenant farmer would certainly look upon the suggestion that when an objection was not sustained the costs should be paid by the objector as an autocratic procedure. The tenant farmer objected to lines crossing his farm when he was quite unable to obtain a supply of electricity therefrom. Mr. D. C. L. Murray (Assistant Secretary, Council for the Preservation of Rural England) said that although it was recognised that overhead lines were necessary, every effort should be made to preserve the amenities of the countryside.

Landowners' Opinions

Mr. J. E. Edmunds (Country Gentlemen's Association), while agreeing that undue delay in obtaining wayleaves should be avoided, objected to the time limits mentioned by the author, which would not give owners and occupiers sufficient time to criticise any proposal either favourably or adversely. He asked supply authorities to provide better bird guards in the interest of preserving the value of shooting areas. Standardisation of wayleave rentals and compensation would be very difficult owing to the varying values of land according to the purpose for which it was used. His Association wished to assist in every reasonable manner in facilitating the supply of electricity in rural districts. Mr. Crofton Black (Land Union) remarked that there were cases in which the whole lay-out of an estate was affected seriously by the existence of overhead lines for which wayleaves had been granted before the land was thought of being developed. It was exceedingly difficult to arrange compensation or the removal of the lines. This sort of thing had a big influence on willingness to grant wayleaves. When supply authorities produced a more flexible wayleave form there would be greater progress. Mr. W. A. Hamilton (Incorporated Society of Auctioneers and Property Agents) supported the previous speakers.

The President and the author pointed out that the Association was concerned with distribution lines, 90 per cent. of which would be on wooden poles, and therefore there was no need seriously to discuss steel towers. Moreover the main grid lines were completed for all practical purposes and they doubted whether any more steel towers would need to be considered by property owners. Mr. W. Fennell, chairman of the Wayleaves Committee of the Association, referred to the clause embodied in wayleave agreements for the last ten years which gave the landowner the right to ask for a line to be removed and for giving an alternative route.

Mr. G. W. B. Bick said that wooden pole lines were easily removable when necessary and therefore the difficulties that had been mentioned should hardly arise. Standardisation of wayleave rentals and compensation would be very difficult owing to the impossibility of knowing how land would be developed and the purpose for which it would be used. The provision that the Minister of Transport should deal with the removal of lines and with compensation in cases of dispute meant that both sides would get a fair deal. Mr. A. L. Stanton said that there should be some simple and concise method of reaching decisions far more quickly than was possible at present and at less expense. Unless we changed the present order of things it would be a long time before hopes of cheap supplies materialised. There was little doubt that if electricity were available at a reasonable price half the present difficulties would disappear, inasmuch as resentment existed, on the one hand, that supply was not available and, on the other, the present system of procedure helped to add to the cost of giving supplies in rural areas.

Mr. Fennell agreed that a great deal of the prejudice against distribution lines had been brought about by the grid towers, although he did not suggest that the Central Board was to blame in any way. The point of view to adopt with landowners was that an important service would be rendered to the local community. The Electricity Commissioners' draft wayleave agreement consisted of fourteen pages and was so complicated that the Association could not agree to it. Nothing had been heard of it now for two years.

Mr. Sumner, in his reply to the discussion, said that in recommending standardisation of wayleave rentals he did not believe that arbitration need be resorted to except in very special cases. All engineers would be well advised to confer with the Council for the Preservation of Rural England because this body had a big "pull" with landowners.

Coal and Ash-handling Plant

AT a meeting of the London Technical Group of the ELECTRICAL POWER ENGINEERS' ASSOCIATION on March 19th, Mr. T. S. Blenkinsop (in the absence of the author of the paper, Mr. W. C. Murray) surveyed methods of handling and transporting coal and ashes in power stations without reference to any particular make of plant.

The paper stressed the advantage of the belt conveyor in preference to the single bucket gravity conveyor and suggested that where the latter was used it should be arranged to both deliver coal to, and carry ashes away from, the boiler house. The point was also emphasised that where a coal store was only used in an emergency, such as during a strike, then the cheapest form of plant should be installed. The end-discharge tippler wagon system was a thing of the past and attention was called to the popularity of the rotary tippler, especially of the automatic type with which it was said to be possible for one man to tip and return one wagon in thirty seconds.

With ball-bearing idlers which would run for at least twelve months without attention and without wear, and belts which would last seven years and handle approximately one million tons of coal, the superiority of the belt conveyor over all other types was definitely assured. The only limiting feature was said to be the angle of inclination of the belts, which should not exceed 20 deg. Conveyor belts were also being run at much greater speeds than previously, 400 ft. per minute for a 24-in. belt, with corresponding speeds for narrower and wider belts, being standard practice. The totally enclosed type of elevator and scraper conveyor was recommended for power station requirements as in this way the dust problem was automatically solved, the working parts were protected from weather conditions, and maintenance was reduced to the minimum.

Commenting on the difficulties encountered in the disposal of ash, the paper described the chain conveyor working under water, the ash sluicing system, and the steam jet system. The first-named system was recommended if given a reasonable amount of care and attention, maintenance cost not being excessive and the power required small. The sluicing system was claimed to provide an automatic and reliable method of ash handling and it was suggested that it should be given every consideration. Several steam jet systems were working in this country quite satisfactorily.

The Paper Discussed

Opening the discussion, Mr. L. Morton, chairman, referred to fuels with 40 per cent. of ash which had been successfully used. He emphasised the need for being able to deal with such fuels, having regard to the fact that the collieries were getting down to the dregs and desired to make use of every-

thing that was brought up from the pit. He mentioned a dump of 160,000 tons of slurry which was under consideration at the present time for power station purposes. The chief problem was how to convey the slurry to the power station at low cost. There would be mechanical difficulties if a belt were used.

Mr. T. S. Blenkinsop, in some remarks on the paper, emphasised the advantages of the belt conveyor on the grounds of reliability of service and low maintenance and operating costs. He did not agree with the author, however, that a gravity bucket conveyor should be arranged to both deliver coal to, and carry ashes away from, a boiler house, as he considered a gravity bucket conveyor totally unsuitable for handling ashes of any kind. Suction plant for both coal and ashes was a thing of the past.

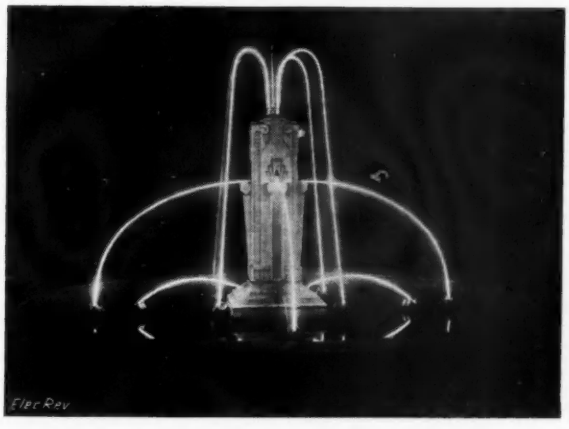
Mr. D. Dixon asked whether any efforts had been made to press ashes when hot, as they came from the power station, into some form of brick for constructional purposes. Mr. S. G. Lodes said that, while ashes were at present used for making breeze slabs, he doubted whether the temperature at which they came away from the furnaces was sufficiently high to enable them to be pressed immediately into bricks. Collecting the riddlings was a serious problem in many power stations. The aim was, of course, to return them to the bunkers.

Belt Vulcanisation

Mr. H. F. Fox (British Goodrich Rubber Co.) said it was now possible to vulcanise belts *in situ* and make them endless, and said that small steam or electric plants were now available for the purpose. The work required a certain amount of skill, but it was being done quite satisfactorily both on the site and also in the works in the case of new belts, the latter being preferable where possible. The work was not cheap, but once the joint was made in this way, provided it was done efficiently and a good quality belt was used, the results amply repaid the extra cost. Mr. Fox offered to lend anybody concerned the necessary apparatus for them to try out the process. Mr. G. H. Fowler asked whether any methods had been devised which obviated the considerable breakage of coal that now took place in handling.

Mr. Blenkinsop, by way of reply to some of the points mentioned, said he felt it was very fortunate that coals with 40 per cent. ash were not usual. To permit of them being pressed directly into slabs would mean that the ashes would have to be in an almost liquid form, and that would play havoc with the stoker equipment. On the question of coal breakage, he assured Mr. Fowler that coal was now loaded into ships in such a manner that it was practically laid gently on the floor of the hold, and the same type of apparatus was available for power stations.

Mr. Reams (North Metropolitan E.P.S. Co.) expressed regret that no mention had been made of plant for dealing with the dust from pulverised-fuel fired boilers, which was an important question. The North Met. Co. had four electrostatic precipitators in use, while two more were being installed. Consideration was also being given to the water sluicing system. He disagreed with Mr. Blenkinsop's statement that the suction system was dead, because his company had put in four 200,000-lb. boilers at Brimsdown, working on pulverised fuel, and had adopted the suction system for handling the ashes. The equipment had been operating for two years quite satisfactorily. He believed that, at any rate so far as pulverised-fuel fired boilers were concerned, there was still a future for the pneumatic type of plant.

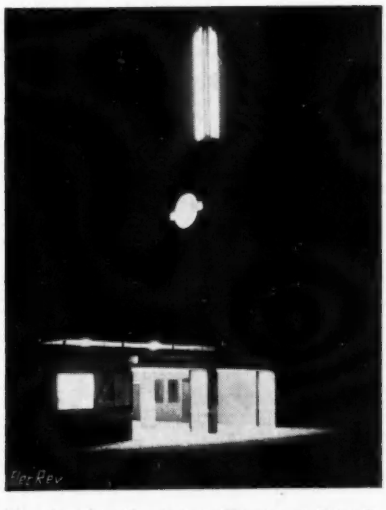


This handsome fountain with light blue neon lighting is at Messrs. Maclean's establishment at Brentford on the Great West Road

Mr. Blenkinsop, referring to the discharge of grit from chimneys, said he believed that the electrical precipitation method was the most efficient. The disposal of the dust after it had been collected was another extremely difficult problem. At the new Dunston-on-Tyne power station, where the dry suction process was used, the dust was being pumped, with water, half a mile away in order to fill up an area of land which was to be used for a coal store. That power station had been in operation for only six months, and already an area of three acres had been covered to a depth of about 5 ft. In spite of what had been said as to the use of the suction ash plant at Brimsdown, he was not altogether convinced that it had a very big field now. The power consumption was enormous, and so was the maintenance of the pipes; he had seen a pipe 1¾ in. thick worn through in three days.

The Economics of the Grid

THE object of the paper by Mr. J. M. Kennedy which was read before the ASSOCIATION OF SUPERVISING ELECTRICAL ENGINEERS at Manchester on March 22nd was, first, to justify the construction of the national grid by showing with the aid of tabulated statistics and graphs that the economies in the cost of generation that will result from the interconnection of generating plant will be amply sufficient to pay all charges on the cost of such interconnection, and, secondly, to consider how the cost of electricity purchased in bulk is likely to compare in future with other forms of power for industrial purposes.



The London Passenger Transport Board's new "Underground" station at Osterley

While the estimation of savings was based on a considerably more rapid growth of output than has actually taken place, the author shows that since 1931 there has been a clear indication of recovery. He has every reason to hope that by 1934-35, or the following year, the original estimate will be reached, if not exceeded. Up to the end of February, 1934, the output was some 15 per cent. above that for the corresponding period of 1933.

Having argued that the interconnection of generating plant and the control of production on a national scale is an economic proposition, Mr. Kennedy next considers how the grid price is made up and what the resultant cost will be to different classes of undertakings. The consumer's annual load factor calculated in the ordinary way need not be considered, but only his load factor on the basis of the maximum demand which he imposes on the undertaking at the time of the undertaking's peak in the four winter months. Thus all diversity is to the benefit of the undertaking, which can formulate its tariff to the consumer accordingly.

The importance of this cannot be overstressed. For any industry with a seasonal production, or in which production can be so regulated that the maximum demand does not occur at the critical points in the undertaking's load curve, it will be possible for the undertaking to quote special tariffs. All-night water heating, for example, should be offered at, say, ½d. per kWh, which would cover the grid running charge, plus losses, with a reasonable margin of profit.

Independence involves the installation of plant in advance of anticipated requirements, with ample standby capacity, the capital charges on which must continue to be paid for, say, twenty years, whereas the grid price is limited to seven or ten years with a reasonable prospect of reduction thereafter.

As a comparative example the fixed costs of a 300-kW Diesel installation with standby of similar capacity would just equal the lowest grid rate. But the running costs would be so different as to leave little doubt that any progressively minded supply engineer would be able so to frame his tariff as to put forward an attractive proposition in any such case without counting upon the many incidental advantages which the consumer would reap if relieved of the responsibility of providing his own plant.

Slag Accumulation. By Vernon Walker, A.M.I.E.E.

Recent investigations into its effect on boiler furnaces

COAL ash is a complex mixture of mineral substances consisting principally of compounds of silica, alumina, ferric oxide, calcium oxide, with smaller amounts of magnesium oxide, titanium sodium oxide and sulphur trioxide. These impurities cause difficulties in ash disposal, dust emission, clinker formation, refractory failures, expense in stoker maintenance and slagging of the boiler heating surfaces. The use of lower grade coal and higher boiler ratings have increased these difficulties, one of the most important of which is the effect of slag formation on the heating surfaces which often limits the time a boiler can be kept in service.

A comprehensive report recently made by Mr. H. F. Johnson, of the University of Illinois, and issued by the Prime Movers Committee of the Edison Electric Institute, deals with the formation of slag. The opinion is expressed that the adherence characteristics of the ash is the controlling factor in slag problems.

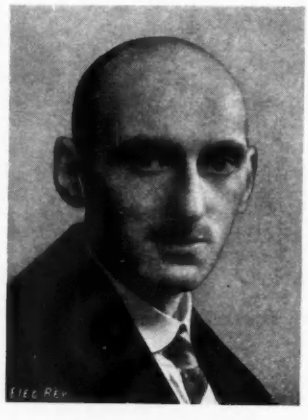
Coal ash as it enters a furnace consists generally of distinct particles or crystals of sizes from sub-microscopic to several millimetres. They are dispersed throughout the coal substance but also exist as more or less segregated bedding planes where they have crystallised.

When coal enters a furnace the first reaction is the loss of moisture, the dry mass probably being a little more porous than the original. This is followed by the liberation of gases comprising CO_2, CO, H_2 and heavier hydrocarbons, which are ignited as they reach the necessary temperature and oxygen. These reactions in the coking zone have, however, little effect on the ash. After combustion the ash may be visualised as new compounds formed by decomposition and oxidation, oxides of iron, sulphur dioxide and sulphur trioxide having been formed from ferrous sulphide.

The " Agglomeration " Point

If the ash particle is attached firmly to a piece of burning coal or ash on the fuel bed it may remain there, or it may adhere to other pieces of ash or burning coal, even if the temperature is below the softening point where chemical combinations occur. Whether a particle leaves the fuel bed or not depends not only on its density but on its shape and the velocity of the gas current.

With pulverised fuel the flight will have begun even before combustion takes place, and the particle will be surrounded by a film of hot gas which tends to make it buoyant. During the passage of the particles through the furnace they must cross the zone of highest temperature, and no matter whether they have heat given to them by the combustion of attached carbon or whether they only attain the temperature of the gases, they will approach and probably exceed the adherence temperature or " agglomeration point." On colliding with similar flying particles, or a solid substance, they will adhere, with the enhanced possibility of dropping to the fuel bed. As particles carrying burning carbon will retain their temperature longer than pure ash particles, they will slag over a greater portion of the boiler tubes.



Mr. Vernon Walker

Above the agglomeration temperature the tenacity of adherence increases more and more until the fusion point is reached, though few realise that solid particles sometimes adhere with more tenacity below their melting point.

Mr. G. Tammam has observed that for pure oxides and salts other than silicates, the particles adhere to one another at temperatures approximately equal to one-half of the melting point, and for silicates at approximately 0.85 of that figure. Tests were carried out in which a blast of air was passed over the powdered substance, and the temperature at which the powder ceased to fly was taken as the temperature of agglomeration. As coal ash is not a pure compound the relation between the agglomeration and fusion temperature is not easy to predict.

The composition and characteristics of the material carried from the fuel bed invariably differ from that of the original ash, the flux content of the slags collected from the walls and tubes being higher with a marked increase in the iron content. The softening temperature is also generally lower, which results from the difference in composition or from the heat treatment to which the ash has been subjected. This shows that a prediction of slag accumulation on the boiler tubes based on the study of the total ash after a laboratory test may be erroneous.

As regards clinkering, most of the ash remains in the fuel bed and the reactive constituents are already in contact with one another or can be brought together by the working of the stoker. A selected portion only of the ash arrives amongst the tubes, and the conditions are entirely different. With the slagging-bottom method of ash removal as applied to pulverised-fuel boilers in America, the proportion of total ash fired passing to the stack increases with an increase in fluid temperature of the original ash, being about one-third of that with the dry-bottom type.

Temperature Distribution and Gas Velocity

The reactions leading to slagging are influenced by the temperature distribution of the fuel bed, and velocity of the gases. Mr. R. A. Sherman states that it is not necessarily the maximum temperature in a furnace that determines the conditions of the ash particles when they reach the tubes, but rather the highest temperature of the particles. On a chain grate stoker immediately above the fuel bed the temperature increases from about 2,400 deg. F. near the front to 2,600 deg. F. at the centre, and then decreases to the rear. For underfeed stokers the maximum temperature is about half-way between the front wall and the end of the extension grates. For pulverised-fuel furnaces with " U " flame burners and a total distance of 50 ft. between burners and tubes, the temperature reaches about 2,600 deg. F. near the turn of the " U " about 25 ft. from the burners.

The most important consideration in the composition of the gases in relation to slagging is whether they are of an oxidising or reducing nature, reducing gases tending to raise the softening temperature of the ash. Over a chain grate the percentage of the reducing component such as CO, H_2 and hydrocarbons are higher near the front and decrease towards the rear; the CO_2 content increases from the front to the centre, and then decreases towards the rear. Over underfeed stokers the CO is highest near the surface of the fuel bed about the middle of the stoker, and decreases on either side. In certain pulverised-fuel furnaces the CO and H_2 were found to be as high as 2 to 6 per cent., and did not decrease to approximately zero until a point was reached 40 ft. from the burners.

The initial velocity of the gas arising from the fuel bed may vary widely with differences in air pressure, variations in fuel departments or holes in the fuel bed, and will decrease as it approaches the tubes as its volume decreases with the lowering of temperature. The velocity of the gases over a chain grate stoker will average from 15 to 25 ft. per sec., but with restricted gas passages it may reach 60 ft. per sec. Over underfeed stokers the velocity is lower owing to the absence of arches, and may vary from 5 to 20 ft. per sec. With pulverised fuel the highest velocity is usually at the lower part of the furnace, where the flame turns upwards, and is approximately 20 ft. per sec.

Mr. Sherman found that the percentage of ash carried by the furnace gas was 1 to 9 per cent. of the total over an underfeed stoker, the values being somewhat lower with coals of a high sulphur content because the ash was more fusible and tended to form immovable clinkers. A larger amount of ash was carried in the case of a chain grate, 7 to 14 per cent. being recorded, the fuel bed being thinner, the velocity of gas higher and the tendency to clinker less. In powdered-fuel furnaces the ash will drop out of suspension as the gas velocity decreases. The percentage of ash entering the boiler tubes may vary from 14 to 92 per cent. of the original.

Electric Currents and Lead Pipes

In the Report of the Water Pollution Research Board for the year ended June 31st, 1933 (Stationery Office, 1s.), reference is made to the belief that contamination of water by lead has resulted from the leakage of electric current through service pipes. This aspect is being studied by the Department's chemical research laboratory in collaboration with the Electrotechnics Section of the National Physical Laboratory. The preliminary results obtained seem to indicate that appreciable increase in the quantity of lead in the water is unlikely unless the leakage of electrical current is unusually large. These experiments are concerned only with the contamination of the water and not with the effects of electrical leakage on the outer walls of buried lead service pipes.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

A Lift-control Problem

We are interested to note a letter from a director of Messrs. J. & E. Hall, Ltd., in your issue of March 16th, referring to the possibility of danger arising from faults on the wiring system of control circuits of lift gear using metal rectifiers. Just as it is possible to avoid the risk in the case of d.c. supplies, we believe it is equally possible to avoid such risks by paying suitable attention to the circuit layout in the case of rectifier-operated installations operating from a.c. mains. To make this point clear we are enclosing two circuit diagrams, of which fig. 1 illustrates the arrangement to which Messrs. J. & E. Hall, Ltd., have referred.

For the danger which they mention to arise there must be separate fuses in the d.c. circuits from the rectifiers, such as are indicated by the fuses f_1 and f_2. In this case, if an earth occurs on a control switch such as the switch S_1, fuse f_1 will blow as soon as the switch is closed, but will leave a "current-doubler" type of circuit supplying the coil associated with this switch so as to maintain it at approximately half-voltage. The circuit by which this maintaining path occurs is through the limb r_4 of the rectifier acting as a series rectifier, and limb r_1 acting as the parallel rectifier during the reverse half-cycle.

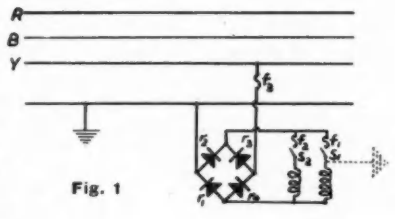


Fig. 1

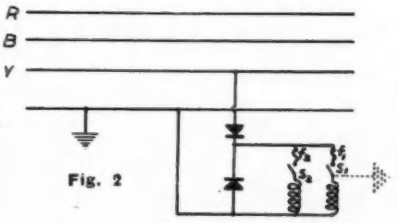


Fig. 2

The risk of danger from such a fault can be removed by avoiding fuses f_1 and f_2 and using a fuse only in the a.c. lead to the rectifier, as shown at f_3. In this case an earth on a switch will merely cause the whole of the rectifier circuit to be removed from the a.c. supply, and there will be no risk of any half-voltage maintaining circuits. There is, however, a possible objection to such a common protection fuse, in that the failure of a coil associated, say, with the upward motion of the lift will also render the downward coils dead, so that once the lift has started, and the control gear has been tripped by the failure, the lift will be immovable until the fault is cleared, and it will not be possible to return it to a floor.

On account of this, we suggest that, as an alternative, the circuit shown in fig. 2 is available, in which the rectifier is arranged in the "current-doubler" circuit; in this case an earth to one of the switches merely causes the blowing of the fuse associated with it, and cannot give rise to any form of maintaining circuit.

In view of the widespread use of metal rectifiers in connection with such control equipment, we should like to thank Messrs. J. & E. Hall, Ltd., for bringing forward the information regarding possible risk of incorrect operation due to earth faults.

Westinghouse Brake & Saxby Signal Co., Ltd.,
L. H. Peter, M.I.E.E., *Chief Electrical Engineer.*
London, N.1, *March 19th.*

Contractors and Supply Authorities

It was with extreme interest that I noticed a letter from "Small Contractor" in your issue of March 9th, reopening the discussion on the rapidly increasing evil of supply companies and other authorities carrying out contracting work. As a contractor, however, I must express surprise at the apparent lack of interest among contractors in general in the danger of this menace. For some time past this question has been raised in your correspondence columns at infrequent intervals, but instead of contractors taking up the challenge and making a stand for their rights they are content to allow only one or two to make attempts to prolong the discussion by replies, and then the subject is again dropped.

Now to all who have any concern whatever for the future I make an appeal to attack this menace wholeheartedly. If you wish your businesses to survive the fate of the gasfitter, you must make a *united* stand to combat and stamp out this stranglehold of unfair competition immediately and show your enemies that their business of current-producing is a whole time job if they do not want to be notorious for those frequent "black-outs" due to failures. Immediate action is vital.

March 20th. Another Contractor.

Power Station Operating Results

Since, and indeed before, the selection of stations by the Central Electricity Board, we have heard much about generating costs and over-all thermal efficiency. The two are often very far from being the same thing. Station costs, which are essentially fuel costs, are of most interest to the Central Board and thermal efficiency to the Electricity Commissioners.

An undertaking having two or more stations in parallel on its system should be able, by arranging for the most efficient loading of each, to obtain better results than those which own one station only. Often, however, good figures at one station are obtained at the expense of another, and the over-all costs of the undertaking compare unfavourably with those obtained by some one-station undertakings.

The race between low fuel costs and high thermal efficiency must come to a halt soon. Engineers, especially those who have actually compiled fuel figures, to instructions, are beginning to doubt the validity of some of the results claimed. Under grid operation owners of selected stations will have to keep careful records, open to inspection at any time, and it will be interesting to see whether the previous good figures are maintained and how they are obtained.

Engineers are, as engineers, naturally anxious to get high efficiency, but we must think in terms of cost. Cost is what matters most and thermal efficiency, although of great professional interest, must not be striven for at the expense of over-all costs. The burning of low-grade fuel has greatly reduced the fuel costs at several stations, but it has also lowered their thermal efficiency. Their engineers are now turning their attention to improving the efficiency and are thus still further lowering their costs; but the fuel costs were first reduced, and rightly so.

When one takes the trouble to investigate some of the claims for high thermal efficiency, one finds difficulty in making the recorded results agree with the fuel costs, if the lb. per kWh, the cost per ton, and the calorific value are known. Further, when one hears of low fuel consumption per kWh and ascertains the number of kWh generated, one sometimes finds that

The new Stamford Hill (London) automatic telephone exchange was opened last week. Our photo shows the Mayor of Stoke Newington (Sir Herbert Ormond), Mr. W. H. U. Napier (Controller of the London Telephone Service), and Councillor M. E. James, chairman of the Tottenham Urban District Council, at the opening

the fuel paid for differs from the calculated fuel consumption. When the two do agree one wonders how the low fuel consumption is obtained with such a poor calorific value. In a case that came to my notice the coal was weighed as actually received, but was sampled after the addition of 5 per cent. moisture and after under-ash had been put back into the hop-

pers; the result was to raise the over-all thermal efficiency from about 18 per cent. to 21 per cent.

While the engineers at many individual generating stations are getting very creditable operating results, many others genuinely believe that they are obtaining better figures than they really are, due to their being misled by those providing the data. All generating station engineers worthy of the name look forward to the time when operating results will be more closely scrutinised and then published by the Electricity Commissioners. Such returns to be of any commercial interest must give the fullest possible details. Maximum demand, load factor, kWh generated and fuel cost per kWh, are valueless by themselves. We want to know, for instance, the class of fuel used, the distance from the coal fields, the price per ton delivered, full details of the plant, and the turbine room and boiler house efficiency. A real comparison could then be made between the operating results of various stations and undertakings.

I hope that the Commissioners will do something on these lines ere long. Some of the enviable operating results reported make some of us think we have missed our vocation in becoming generating station engineers. Square Peg.

March 14th.

Domestic Heating and Cooking

It has been brought to my attention that in an article with the above title in your issue of February 23rd the following statement has been made in respect of the oven elements of the electric cooker being manufactured by the Pressed Steel Co. of Great Britain, Ltd.:—

> "It is the first oven we have seen fitted with embedded tubular-type elements of the pattern used for boiling plates."

I would like to point out that the "Hotpoint-B.T.-H." electric cookers, models 6512 and 8812, have always been fitted with "Torribar" sheathed wire heating units both for boiling plates and oven elements. I bring this to your attention because the statement published in your article is likely to be misleading. O. H. Buckingham,

General Manager, Hotpoint Elec. Appliance Co., Ltd.

London, W.1, *March 22nd.*

The E.I.B.A. Council

I shall be grateful if once again I may be allowed to use your columns to call for nominations for membership of the Council of this Association.

Our annual general meeting takes place in April, and it is at this meeting that the Council for the ensuing year is elected. We are, of course, always delighted to welcome new members on our Council, and if those who are interested will be kind enough to submit their names to me, I will see that they appear on the agenda to be balloted for at the annual meeting. J. T. Keeping,

General Secretary, Electrical Industries Benevolent Association.

London, W.C.1, *March 23rd.*

An Equitable Two-part Tariff

A two-part tariff should not savour of income tax; such a charge is not equitable and is resented by consumers. The primary charge should be such that similar consumers on a supply system are charged the same price for corresponding supplies, irrespective of the rateable value, number of apartments, or floor area of their houses.

The Electricity Supply Act, 1882 (Sect. 19) states that "a person shall, on application, be entitled to a supply on the same terms as any other person, in the same area, for a corresponding supply." The rateable value two-part tariff violates the terms of this Act, and also, contrary to par. 56, Sec. 20 of the same Act, undue preference is shown in this way to certain consumers.

For example, two consumers requiring 1,920 kWh per annum, 6 kW maximum load with 350 W of lighting, are charged under a two-part tariff £1 per apartment + ½d. per kWh. One consumer, living in a three-apartment house pays £7, and the other, living in a ten-apartment house, pays £14 for a similar supply, which is unjust. Consumers in smaller houses tend to become extravagant in the use of electric lighting, while those in larger houses exercise strict economy in the use of electricity for any purposes.

Consumers who move to a larger house are dissatisfied with the increased cost of electricity. Some discard electric cooking and heating, after several years' satisfactory experience. This is not an advertisement for the electricity supply authority for the discontented consumer broadcasts his disapproval of the electricity rates, more especially to those who are contemplating becoming users.

Advocates of the rateable-value system of charging explain that the more energy consumed the less the difference in the relative costs to the two consumers. This cannot be disputed, but supposing the two consumers increased their consumption until they demanded the whole available output of the power station, divided equally between them. The cost per kWh would be nearly ½d. in each case, but the consumer in the larger house would still have to pay £7 more than his neighbour, for the same service.

Another vexed question is the disparity between tariffs in undertakings supplying neighbouring areas. A consumer on one side of the street is charged considerably more than one on the other side supplied by another authority. This disparity is very unfortunate, but the disparity between consumers supplied by the same undertaking is iniquitous. C. V.

March 22nd.

Electro-thermal Apparatus

In reply to "E.H.," in your issue of March 23rd, I beg to say there are no switches shown in the diagrams. Elements were placed in troughs in the early days but were not of this improved type and the drawbacks of the old type and the method of platen heating that he mentions have been dealt with in earlier articles. Warping of platens is best avoided by a scientific and symmetrical arrangement of heat gradients and not by increasing the mass of metal, which for some purposes may be a considerable disadvantage.

The hot-plate shown in fig. 2b would need to be cleaned after the contents of a saucepan (which are not necessarily liquid), had boiled over just as any other would, but nothing untoward happens to the metal. In fact, other types may be chilled and thereby damaged by a boil-over, but with the construction to which I referred no mechanical strain can be transmitted to the plate. Charles Baxter.

Manchester, *March 25th.*

"Free" Cookers Criticised

Our attention has been drawn to a letter in your column by a Mr. Perks. No doubt supply authority engineers, more competent than ourselves, will reply to Mr. Perks; but, as this gentleman is apparently afraid that the psychological effect of the free cooker scheme would hold up the development of electricity generally, we should like to assure him that a number of our customers who have adopted such a tariff are putting out from five to eight times the number of cookers which were taken when offered on simple hire in the ordinary way. We are perhaps reassuring Mr. Perks when we tell him this, but, if not, we should also like to remind him that the gas companies built up their business with "five lights and a cooker," all to be paid for through the penny-in-the-slot meter.

The success of the free cooker scheme is undoubtedly due to the average consumer's psychology. In the case of one undertaking it was reported that a number of middle-class consumers had taken on a cooker as soon as the free rental scheme was advertised, and it transpired, on inquiries being made, that these people were not prepared to pay 5s. per quarter for an electric cooker when a gas cooker could be hired locally for 2s. 6d. (apparently no advertising or propaganda reached them to show that the electric cooker was worth double the amount), but these consumers had no difficulty in understanding that an electric cooker with no rental at all was cheaper than a gas cooker at 2s. 6d. per quarter. In the case of one undertaking about 2,000 cookers have been put out in less than twelve months on the free rental scheme, whereas the output of cookers in the year before the free rental scheme was adopted was only between 300 and 400. There have been no complaints from consumers regarding the operating costs.

Mr. Perks appears to overlook the fact that the average free cooker scheme is only a more sensible method of collecting rental at the rate of about ½d. per kWh on the first 300-350 kWh per quarter, depending upon the sum required; therefore consumers are not paying any more for energy than they would normally.

We trust this letter reassures your correspondent, whom, we are quite certain, must have the good of the electrical industry at heart. The Jackson Electric Stove Co., Ltd.,

S. C. Hurry, *Sales Manager.*

London, S.W.1, *March 26th.*

A Shocking Affair

My attention has been drawn to a sentence in a story appearing in a woman's magazine; I think it really deserves wide publicity among electrical men:

"... the kiss shot through me like a volt of electricity."

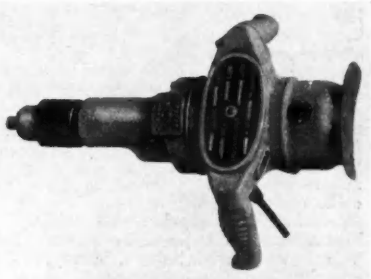
March 24th. E. E.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Portable Drills

MESSRS. CHARLES CHURCHILL & CO., LTD., Walnut Tree Walk, Kennington, S.E.11, have been appointed sole distributors of a new line of electric drills made by the General Electric Co., Ltd. All motors are of the universal type for 100/110, 200/210, 220/240 and 250 V. Types "K.U.1" and "K.U.2" are designed for ¼-in. standard and continuous duties, respectively, and "K.U.3" and "K.U.4" for similar ⅜-in. drilling. The tools are fitted with pistol-grip handles and the switch is so placed as to be always under complete control. The loadings are from 170 to 300 W, and the weights from 7 to 10¾ lb. Prices, including 8 ft. of flexible cable with earthing lead and a Jacob's chuck range from £6 10s. to £11 10s.



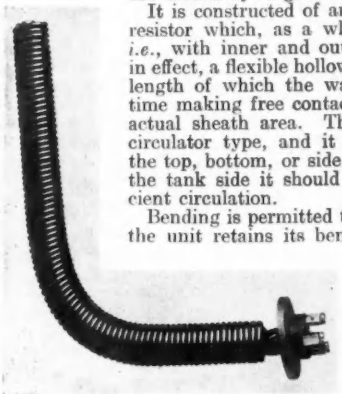
The type "KU" drill

Types "K.U.5" to "K.U.8" have two handles set at such an angle as to reduce fatigue in operation; the right-hand one comprises a quick-make and quick-break twist-grip switch fitted with a large inspection cover. Nos. 5 and 6, for ½-in. standard and heavy duties, have a loading of 300 W and weigh 12¼ lb. to 14¾ lb. They are supplied with cable, breast plate and chuck at £13 and £15, or with a No. 1 Morse taper socket for 30s. less. Nos. 7 and 8 (loading 400 W and weight 15½ and 16 lb.) are designed for ½-in. drilling and have either a breast plate or a 3⅜-in. feed screw and a Morse taper spindle. Their prices are £15 and £17.

For production drilling and reaming, types "K.U.9" and 10, with a loading of 500 W, and weighing 27¾ lb. and 28¼ lb., are available at £18 10s. and £21, the price including the cable, 2⅜-in. feed screw with machined guide and No. 2 Morse taper. Drilling pillars and magnetic drill pillars can also be supplied.

A Flexible Immersion Heater

Although the actual sheath temperature of the "J.P." flexible immersion heater for water-heating equipment recently introduced by the J.P. TUBULAR HEATER CO., LTD., Newarthill, Lanarkshire, is considerably lower than that generally employed, greater overall heat emission is claimed by reason of the unusually large sheath area.



The "J.P." semi-rigid immerser and circulator

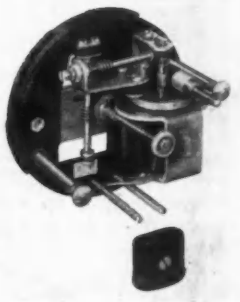
It is constructed of an insulated and sheathed resistor which, as a whole, is double spiralled, *i.e.*, with inner and outer layers, so as to form in effect, a flexible hollow tube through the entire length of which the water passes, at the same time making free contact with the whole of the actual sheath area. The heater is thus of the circulator type, and it can be fitted in either the top, bottom, or side of the tank. If fitted in the tank side it should be bent to provide efficient circulation.

Bending is permitted to any desired angle, and the unit retains its bent form, so that the hot water can be directed to the outlet, irrespective of the latter's position. By reason of the disturbance effected by free expansion and contraction inherent in this flexible construction furring troubles are largely overcome, while the large surface area permits a low loading intensity. The tubular sheath is of heavily tinned pure copper and about $\frac{3}{16}$ in. in diameter.

The immersion heater is adaptable to any form of automatic or non-automatic switching and is loaded at 3 kW; it is available in lengths of from 20 in. to 42 in. (inside tank), a standard 20-in. heater costing £4 5s., or £6 15s. as a thermostat combination. The longer heaters are also available loaded at 4 kW. Suitable fixing flanges are available, and all sizes are arranged for three-heat control.

The "Temco" Mains-driven Electric Clock

A recent addition to the range of mains-driven synchronous clocks is the "Temco," made by the TELEPHONE MANUFACTURING CO., LTD., Hollingsworth Works, Dulwich, S.E.21. This timepiece employs worm-drive throughout, and the mechanism is standardised for all models, being enclosed in a moulded bakelite drum. The removal of this reveals a heavy bakelite disc forming the foundation for all the components. The motor is mounted with its rotor spindle vertical, thus minimising side thrust and allowing a compact layout. The stator is built up of an iron pressing bent to a rectangular form which encloses the energising coil. One of the flats of the stator is much wider than the others, and in its centre is a circular hole. This hole has a number of internal pole-pieces, and the rotor is located in the ring thus formed.



The mechanism of the new T.M.C. clock

The stator strip is lap-jointed and spot-welded at the point opposite the ring of pole-pieces, and, in addition, a hole is bored through the overlap for the attachment of the coil core. The stator-coil winding consists of about 28,000 turns of 45-gauge wire, wound on a moulded former and finally taped for protection. The rotor is an iron disc provided with pole-pieces around its edge, both these and those of the stator being slightly staggered to assist in starting and running. The lower bearing of the rotor spindle is jewelled and fitted in the actual core of the stator coil. In addition to the rotor, the spindle also carries a heavy brass flywheel to assist in starting and to give a carry-over effect during momentary interruptions of the supply current. The flywheel is resiliently mounted by a spring-wire attachment which allows of the rotor being pulled into step with the frequency of supply as it approaches synchronous speed. Starting is by a spring-loaded plunger, which, when pressed in and released, spins the rotor. The upper rotor-spindle bearing is fitted with a small spring to secure silent running.

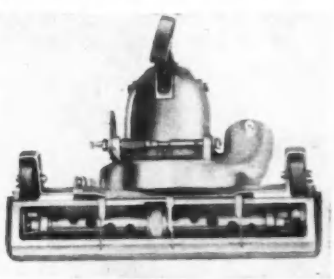
The gear reduction train is made up of three worm and worm-wheel stages, the first worm-wheel being of bakelised fibre and the others of brass; all the worms are of steel, cut solid with their spindles. The third spindle revolves once in two minutes and a disc fitted to it indicates seconds and provides a signal of the continued action of the movement. The motion-work wheels for the hands are mounted on a brass bridge-piece which is moulded into the main bakelite disc, while a second bridge plate spans two pillars and provides the rear bearing for the centre spindle. The moulded drum back does not carry any fittings, the starter, setting spindle and contact pins merely passing through clearance holes in it. The contacts are recessed and the contact sockets in the plug are sunk well below the surface of the bakelite.

A central screwed sleeve is used for the attachment of the dial-plate so as to ensure that the dial cannot move.

The clock is available in many forms. For use as a master clock, a synchronous movement is coupled to mechanism which makes half-minute contacts.

The "Duplex" Vacuum Cleaner

Modifications in the design of the "Duplex" vacuum cleaner have been made by the HOTPOINT ELECTRIC APPLIANCE CO., LTD., 24, Newman Street, Oxford Street, W.1. The castors are now placed behind the nozzle to enable carpets to be cleaned close up to a wall, and the rubber buffer has been extended all round the sides of the nozzle. The accompanying illustration is an inverted view of the cleaner showing the new position of the castors and the motor-driven brush for removing thread and hair from carpets. The price remains as before, *i.e.*, £15 15s., with complete equipment, and £17 15s. with the addition of a floor-polishing attachment.



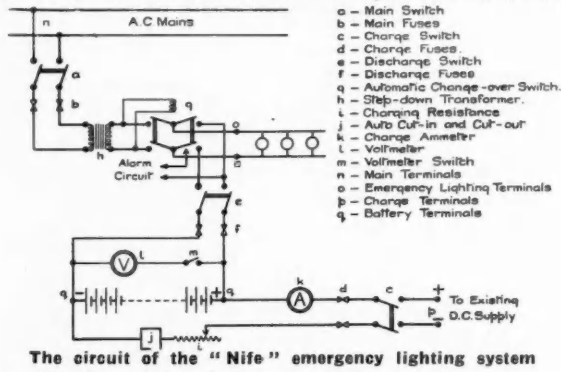
The Hotpoint "Duplex"

Emergency Lighting

A new control panel for the emergency lighting of cinemas has been added to the range of "Nife" equipments supplied by BATTERIES, LTD., Hunt End Works, Redditch. Its design provides for the emergency lighting to be obtained normally from the a.c. mains *via* a transformer, an automatic switch transferring the load to the battery in the event of a supply failure. The nickel-cadmium alkaline battery is charged through a resistance on the panel by d.c. obtained from the existing generator or rectifier installed for operating the cine-arcs. No more elaborate apparatus is required for this purpose, as the battery need be recharged only after emergency use or twice in twelve months to keep it in good condition.

Complete schemes of standby to a 200-250-V a.c. supply are

available; the smallest of these including a 14-Ah battery (three-hour discharge rate), a 125-VA transformer, and a 25-V control panel, costs £31 19s. 6d. The largest standard scheme

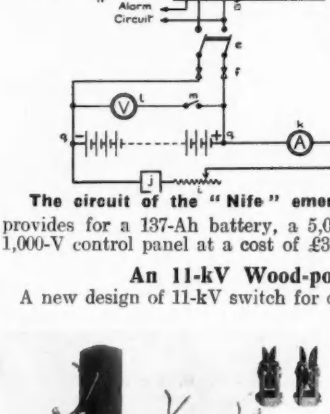

A.C Mains
Alarm Circuit
To Existing D.C. Supply
a – Main Switch
b – Main Fuses
c – Charge Switch
d – Charge Fuses.
e – Discharge Switch
f – Discharge Fuses
g – Automatic Change-over Switch.
h – Step-down Transformer.
i – Charging Resistance
j – Auto Cut-in and Cut-out
k – Charge Ammeter
l – Voltmeter
m – Voltmeter Switch
n – Main Terminals
o – Emergency Lighting Terminals
p – Charge Terminals
q – Battery Terminals

The circuit of the "Nife" emergency lighting system

provides for a 137-Ah battery, a 5,000-VA transformer and a 1,000-V control panel at a cost of £385 10s.

An 11-kV Wood-pole Switch

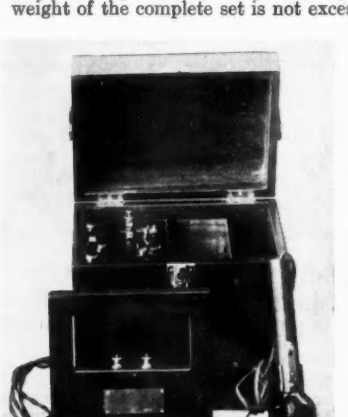
A new design of 11-kV switch for clamping to a single wood pole has been introduced by SWITCHGEAR AND EQUIPMENT LTD., 49, Queen Victoria Street, E.C.4. The "SE" type switch employs self-aligning high-pressure 200-A contacts, bearings with phosphor-bronze liners and spring-loaded buffer stops, and a substantial stirrup-type operating handle which incorporates a universal joint and adjusting turnbuckle. A flexible link attached to the rocking insulator prevents bending of the down leads when the switch is operated. The switch is supplied complete with pole clamps and a long operating rod. A similar design is also available for mounting horizontally for single or "H" poles.



The "SE" 11-kV switch for clamping to wood poles

The "P. & B." Cable Tracer

It is frequently necessary to distinguish between several cables lying side by side in the same trench, or on the same rack, or to trace out the course of a cable in a street where alterations have been made and the landmarks removed. For such purposes the "P. & B" cable tracer is made in a very handy form, in a neat oak box, with a strap for carrying, holding the whole outfit with spare room for connecting wires, &c. The box is quite compact, measuring 11 in. by 11 in. by 8 in., and the weight of the complete set is not excessive, being only 18 lb.

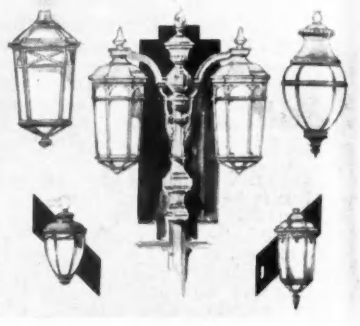


The "P. & B." cable tracer

In one corner of the box is a generator for producing a succession of impulses by means of which the position or course of the cable is ascertained. Next to this is a compartment holding a battery, while along one side and one end are compartments for two search coils, telephone leads, &c. The impulse generator is an induction coil with an interrupter so constructed that it gives a relatively long period of make and then a very sudden break, the contacts being knocked apart by a hammer-like blow. The chief effect of this is to produce a series of impulses having a very powerful effect upon a search coil and telephone, and producing a sound quite easily distinguishable from the a.c. hum and other sounds likely to be picked up from neighbouring conductors. A feature of this construction is that this interrupter seldom needs adjustment and does not stick.

Two search coils are provided, one square and one of the horse-shoe type. The characteristics of these are different and, to a large extent, complementary. Generally, the former is more sensitive and the latter more selective.

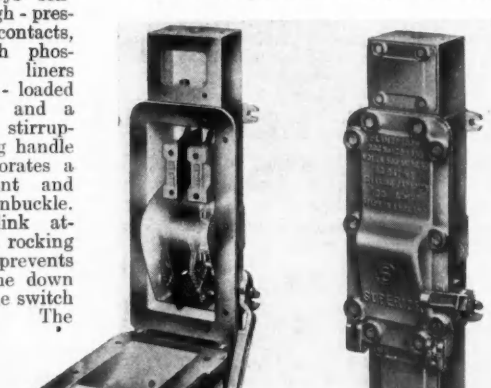
While it may be necessary, sometimes, for the cable to be made "dead," it is often possible to trace or identify it while alive, thus saving time while the main job is actually being done. The steel armouring of a cable, while it must have some effect, does not materially interfere with the working of the apparatus. One cable can be distinguished from another even when they are close together. The instrument is made by MESSRS. PRICE & BELSHAM, LTD., Tamworth Lane, Mitcham, Surrey, and the retail price is £20 complete.



The General Electric Co., Ltd., has produced a number of new designs of lanterns for street lighting and other outdoor illumination purposes. The examples show these to be of an artistic character

Flame-proof Air-break Switches

MESSRS. WM. SANDERS & Co., Falcon Electrical Works, Wednesbury, are developing a range of air break switches and combined switches and fuses for use in fiery mines, industrial situations where the air is laden with petroleum fumes, and other places where inflammable gases are present.



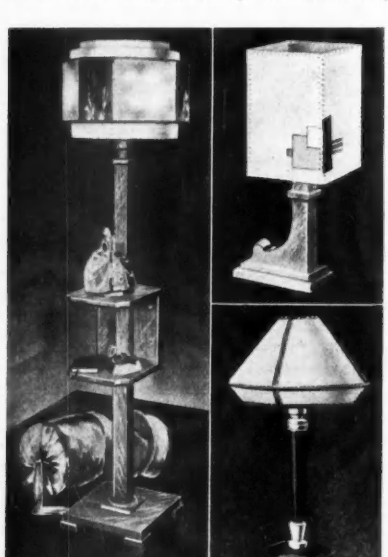
A Sanders flame-proof air-break switch

The range will extend from 20 to 60 A. At present 30-A switches and combined switches and fuses are available. These comply with B.S. Specification 126/1930, and at the standard rating have a breaking capacity of 100 A. They are covered by a Buxton certificate of the Mines Testing Department.

Unusual Lighting Fittings

The lighting fittings illustrated herewith are only three of a large number which have been introduced by KNIGHTSHADES, LTD., 36, Queensway, Ponders End, Middlesex. The floor standard is priced at £3 5s. in oak with revolving shelves, and the shade is of cream moiré "Lumex" with tortoiseshell corners and costs £2 17s. 6d.

At 14s. 6d. an artistic table lamp is available in chromium and ebonised wood with a "Whiteray Vellum" shade. A chromium-plated lampholder costs 5s. extra. Another unusual table lamp (type 114) has a wooden stand, obtainable with an oak, green, or blue finish. The price is 19s. 6d. complete.



Some "Knightshade" standards

Fair Trading. By H. R. Taunton

A contractor's views on the new policy

SELF-CONTROL is the hardly won lesson of time, and the electrical industry is still very young. Its energies hitherto spent on growing, it has become a giant, a little rickety and unhealthy, lacking a code to drill to efficiency its clumsy strength. In England, its education has lately been taken in hand by "Committee D," with its primer in the shape of the "Fair Trading Policy." In Holland, where it has been suffering very much the same troubles, it has now its "Committee C," a permanent body set up by the V.E.H.I. "to eliminate the abuses in the electrical trade" and so "assist commercial morality"—which is practically what our own "Committee D" set out to do.

The Dutch body has not yet got so far as the definite schedules and scales of discounts of our Fair Trading Policy; but its conclusions to date, recently published, make very interesting reading, if only for the side-lights which they throw on our similar problems. In general the report confines itself to stating a few only of the many problems of commercial ethics confronting the industry—which are very much the same on both sides of the North Sea. It makes no attempt, beyond general arguments pro and con, to offer a definite solution of any of them. But, as it says, its "task is not yet finished."

Securing a Majority

Truly, it is not: it is barely begun. As, for that matter, is our own; though, in our Fair Trading Policy, we have advanced to something like a definite code of rules. That is a big step forward; but the step that counts is the one between framing rules and enforcing them. The present draft of the Policy contains no hint of the machinery that must eventually be set up for its enforcement. Discussion of disciplinary methods, however, would perhaps be premature until sufficient trial has shown how far general goodwill will secure its smooth working. It is of little use talking about punishing offenders against a code until that code has proved acceptable to a strong majority.

The securing of such a majority is the first and obvious essential to the success of the Fair Trading Policy. It is not, however, an essential to its inauguration. The beginning of its proposed trial period has been postponed, reasonably enough, until an adequate number of manufacturers, wholesalers and contractors have signed its undertaking. (THE ELECTRICAL REVIEW of January 24th gave the number of those who had done so at that date as about 2,000. It is doubtless now much larger.) It is to be hoped that the Committee will not take an ultra-cautious view of what constitutes an "adequate" number; that it will not shrink from beginning the experiment because it may not yet have the support of a nominal majority of the industry. So long as it has the associations with it, the prestige and influence of most of the leading firms in every section, it need not unduly fear the opposition of the rest, most of them small fry. Let it have a sufficiency of leaders, and the rest will follow, willingly or perforce.

Mr. H. R. Taunton

But a sufficiency of leaders, of course, is necessary in each of the separate sections. The Policy, for example, would have little chance of success if, while the wholesalers and contractors hailed it wholeheartedly, a small minority only of the manufacturers gave it their support—and vice versa.

Will the Supply Authorities Conform?

The supply authorities are not represented among the associations who are mentioned as having adopted the general principles, although their ultimate adhesion to them is clearly assumed in it. It is, indeed, indispensable to its effective working. The supply authorities with every year have been entrenching more deeply upon the preserves of the contractor and retailer as distributors to the public of electrical goods, and are, some of them, the worst offenders against all the principles the Fair Trading Policy is out to uphold. With their rate-aided showrooms, their uneconomic hire-purchase systems, they can undercut the legitimate trader, plausibly justifying an initially profitless sale of a current-consuming article by anticipation of the revenue resulting from its use.

Will they, as a body, accept, in the interests of the industry, a parity in competition with their local retailers? Or, aloof, superior, will they claim freedom to pursue their own immediate interests unfettered by any code in their struggle with their rival, gas, or with what they stigmatise—too often, with reason—as the inertia and financial incompetence of small electrical traders?

It is to be hoped—it may safely be predicted—that they will take the more altruistic view; though "altruistic" is hardly the word: "farseeing" is actually more correct. The welfare of electricity supply is indissolubly tied up with that of the electrical trade in all its branches. Chaos in the one must inevitably mean stagnation in the other; and it is chaos which threatens us. The present welter of discount-snatching, of insane price-cutting, of poaching on each other's grounds—what other outcome can they have but chaos?

Other, older, industries have been through the same phases and have triumphed over them by self-imposed discipline. There is no reason why we should not do the same; the Fair Trading Policy is a hopeful indication that we have at least set about it, in time, we may trust, to prevent the State stepping in and doing it for us, as it is doing in other countries and, in our own, with other industries.

Border-line Cases

We in the electrical trade, however, have difficulties to face which others have not. We have not only those inherent in the phenomenal growth of a young industry, but all those which come from the fact that electricity and its commercial applications touch the life of the community at so many and such diverse points. The industry has so many of what the Dutch report calls "border-line cases."

What internal legislation, for instance, can be devised to control the retail competition of the big stores? Or that of the sixpenny stores? They buy up "bankrupt stocks" or job lots of reputable makes; or, more commonly, they feature cheap lines by non-associated members and foreign rubbish produced by sweated labour, and sell it, with all its potentialities of trouble and disaster, to the undiscriminating public at "bargain" or "clearance" prices impossible to the legitimate trader.

Take, again, the case of the architectural craftsman. On any large wiring contract it is the commonest experience for all the best and most expensive fittings to be selected by the architect from the designs of such a craftsman. The contractor may be told to place the order with him, but no discount is reserved for him. All he gets out of the fittings section of his contract is the worry of handling and wiring the cream of it, and a few shillings of profit on the odd plain pendants. The architect's retort to his complaint, if he dares make one, is obvious. So is that of the architectural craftsman. He owes no allegiance to the electrical industry, nor is he interested in its ideas as to who is entitled to what discount. The Policy has not overlooked the problem; but its statement that the discount on special fittings, not listed, should be the subject of mutual agreement—*if* the purchaser is entitled to discount—hardly solves it.

The Prime Cost Problem

That brings us to the difficult question of prime costs in architects' and consultants' specifications. The Policy has a note to the effect that architects and consultants obtaining electrical fittings on behalf of their clients are not entitled to terms better than those to which such clients would be entitled if they bought them themselves. No one supposes that reputable architects and consultants attempt, as separate and special transactions, to secure for their clients illicit discounts on electrical fittings and apparatus; but in practice, when such goods form part—often the largest part—of an electrical installation, their specifications have the effect of obtaining them at costs varying from net to something substantially below list prices.

The commonest procedure to-day in drafting a specification is to obtain from suppliers net quotations for all the special articles necessary to complete the installation; or alternatively, to look up list prices and deduct the trade discount. The figures so found are quoted in the specification issued to contractors, and they are called upon to include in their tenders the supply of the articles in question at those figures. In other cases, round p.c. figures are quoted—so much for fittings, so much for telephones, and so on—and they are told they must be prepared to produce the suppliers' net invoices for the articles ultimately selected.

It is true that usually—not always—the tenderer is invited to include in his main estimate the profit he requires on the p.c. items scheduled; or—a growing practice—he is told to add to, or show against, each item the percentage he requires to cover his handling of the goods and his profit thereon.

That salves the conscience of the professional man, if he has any qualms on the subject of fair trading. The outcome, however, is the same; his client obtains the most expensive items of his installation at discounts to which he is not entitled, and so much more money is lost to the electrical industry; for no contractor in competition dare add a percentage to the net figures given which would bring them up to anything like true list prices. In effect, where p.c.s form a large proportion of them, contractors' tenders become a kind of Dutch auction in which success is the doubtful reward of the nearest approach to a zero percentage.

It is easy to say that the remedy is in the hands of the contractors themselves, but, competition being what it is, any agreement they might make to add the correct percentage to each item of p.c.s could only prove sheer humbug. A partial solution is promised by the Fair Trading Policy, under which suppliers will presently refuse to quote architects and consultants better terms than their clients are entitled to; but there will still be nothing to prevent the issuer of a specification quoting in it net figures calculated from a catalogue.

Consultants, perhaps, may in time be persuaded to look at the matter from the point of view of the industry to which they owe their livelihood; but it is difficult to see how architects can be brought to it. The use of p.c.s is an immemorial custom of the building trade, and no valid reason can be shown why it should be foregone in the case of one particular form of sub-contract. However, their usual use of them, as large round figures in a general contract, is practically free from the objections under discussion; and, in any case, the sum of the definitely electrical specifications issued by architects, and not by consultants, is trivial.

When all these and similar problems are solved, as energy and goodwill will surely solve them, the principles of the Fair Trading Policy will still be at the hazard of petty encroachments: from within, by greedy and disloyal members of the trade; from without, by that tortuous section of the public which delights in the pound of trouble which gains a shilling's advantage. Only constant watchfulness and strict discipline, for a long time to come, can keep the code from crumbling again into chaos. But who that is alive to the trend of modern economic thought can doubt either the need for such a code or its eventual success? Our present complex civilisation can no longer tolerate the free competition of the past, degenerated into greedy individualism: we have to think and act now as associations, and at the last as communities.

To-day the principles of the Fair Trading Policy may appear ideals—though they have the virtue uncommon in ideals of being utilitarian; to-morrow they will be an assured and smoothly-working habitude. Ideals, if you will; but at least they are now definitely before us—something to aim at. Let us shoot hopefully at the clouds, though for a while we may only bring down an occasional rook.

The Electrical Development Association

Annual luncheon and meeting

THERE was a large attendance at the annual luncheon and meeting of the British Electrical Development Association at the Savoy Hotel, London, on March 22nd. Unfortunately, neither Lord Ashfield (President of the Association) nor Sir William Ray, the recently appointed Executive Chairman, were able to be present owing to illness, and Lord Eltisley, Vice-President, took the chair at both functions. The principal guest at the luncheon was the Rt. Hon. Oliver Stanley, M.P. (Minister of Transport).

Proposing the toast of the Association, the Minister of Transport referred to the recent changes that had been made in its constitution and expressed the hope that the greater resources now at the disposal of the Association would enable it to extend its sphere of operations and carry out its work with greater enthusiasm and success.

After congratulating the Association on securing the services of Sir William Ray, Mr. Stanley said he had been taken to task by some of the leaders of the gas industry for what had been described as his extravagant praise of electricity. No doubt the electrical industry was equally critical when Mr. Runciman lent his greater position and his greater ability and eloquence to the support of the gas industry, but both Mr. Runciman and himself had the same interest in the matter. They were not concerned with which of the two industries should secure a momentary advantage. What they were concerned with was that the people of this country should have put at their disposal the most efficient and most economical service that modern science had made available. The task of the Association was more important than it ever had been now that the grid had been completed and the whole emphasis had been changed from production to sale. There was some reason for optimism in the fact that in 1933 the amount of energy generated was 10 per cent. more than in 1932, whilst in January and February this year there had been an increase of 15 per cent.

The original estimate made by Lord Weir's Committee of the consumption per head of population in order to put the electrical industry on a really prosperous basis was 500 kWh in 1940; we still had a considerable way to go, and the fulfilment of the estimate largely depended upon the activities of the Association. A large part of the public was still ignorant of the advantages of electricity; there was still an idea that it was a luxury, but the publicity and propaganda of the Association was helping rapidly to remove those ideas.

The Importance of Electric Traction

Lord Eltisley, responding to the toast, said he regretted that Mr. Stanley had not said something with regard to transport by means of trolley buses and railway electric traction and expressed the hope that the electrical industry would have the fullest possible measure of support and assistance from the Minister of Transport in these matters. Speaking of the reorganisation of the Association, Lord Eltisley said that it had resulted in sixty-eight additional members paying the full rate of subscription and the enrolment of thirty-one new members, and from that point of view alone it could be claimed that the main purpose of the reorganisation scheme had been happily and satisfactorily achieved. The income was now £60,000 a year, and, personally, he believed it would be many thousands more than that in a very short time.

In the course of further remarks Lord Eltisley thanked the manufacturers, contractors, wholesalers and others for the public-spirited way in which they had accepted the position created by the reconstitution of the Association, and after congratulating the Association on the appointment of Sir William Ray as Executive Chairman, spoke in terms of high praise of Mr. Cramb and his staff for the manner in which the reorganisation scheme had been carried out and upon the work generally of the Association. Speaking of the manner in which the output of electricity was increasing, he said that in 1922-23 4,500 million kWh was generated; in 1931-32 the figure had risen to 11,500 million kWh. In the same period the consumption per head of population had increased from 88 to 212 kWh; the capital expenditure from £158,000,000 to £380,000,000, and the increase in revenue from £35,500,000 to £58,500,000. The average price charged for electricity had been reduced from 2.08d. to 1.36d. per kWh, and the number of consumers had risen from 1,356,000 to 4,500,000.

Better Road Lighting

After congratulating the Central Electricity Board on the completion of the grid system, Lord Eltisley referred to the number of road accidents which occurred and suggested to the Minister of Transport that he should try the experiment of lighting one of the main highways of the country, say Watling Street, for a distance of fifty or sixty miles with the object of endeavouring to reduce accidents. If such an experiment were carried out he promised the wholehearted co-operation of everybody associated with the electricity supply industry.

Lord Eltisley also presided at the meeting which followed the luncheon. Quoting extracts from a long letter that had been received from Lord Ashfield expressing his regret that he was unable to be present, Lord Eltisley said reference was made to the consumption per head in a number of other countries and Lord Ashfield specially stressed the point that our present figure of 256 kWh per head of population was still lower than in other countries. For instance, in Canada the figure was 1,409 kWh, in Sweden 799 kWh, in Switzerland 780 kWh, in the United States 593 kWh, and in France 295. Expressing the view that the Electrical Development Association had still ample scope to promote the further use of and demand for electricity and the sale of electrical apparatus of British manufacture, Lord Ashfield said that whilst hesitating to make any prophecy it did not seem unreasonable to expect that the consumption of electricity might well reach 20,000 million kWh per annum in the next five or six years.

Mr. H. C. Lamb (chairman of the Council) then presented the annual accounts, which showed an excess of expenditure over income for the year ended December 31st, 1933, of £4,231, and pointed out that cash and investments represent more than £20,000, so that the Association was thoroughly solvent. The accounts were unanimously adopted, and Mr. Lamb pre-

sented the report for the year, which was reviewed in our last issue. Referring to the reconstitution of the Association he said that promises had been received which indicated obtaining 75 per cent. of the maximum possible revenue, although he believed it would be found to be nearer 80 per cent.

In the course of a discussion on the report, Mr. J. W. J. Townley (West Ham) said that whilst the advertising matter issued by E.D.A. was of a very high standard, in the view of a large number of members concerned with districts such as his own it was not the type of advertising that could be expected to appeal to the working classes, many of whom lived in five-roomed and even three- or four-roomed houses. The chairman promised that this matter should be considered.

The Chairman then reported the appointment of Alderman Sir Percival Bower, M.B.E., as President of the Association for 1934-35, and the appointment of Viscount Falmouth and Dr. S. L. Pearce as Vice-Presidents.

The New President

Alderman Sir Percival Bower then took the chair and, after expressing his appreciation at being elected President, referred to certain attacks that had been made upon him by the gas industry. Whilst it was not, and would not be, part of his job to emulate the very bad example set by those representing the gas industry, at the same time he wished to make it abundantly clear that whilst he would not seek to join issue with the gas industry in the same way, if they attempted to tread on his coat-tail he would very surely show indications of his resentment.

The primary job of the Association was to develop the great electrical industry and it was no part of their business to attempt to do that by belittling the energy or the activities of those representing another great industry. On the other hand, if the gas industry was so lost as to balance of outlook and sense of reason that it could not let any opportunity of attacking electricity go by, then he felt the electrical industry would be wanting if they allowed statements that were drawn from the imagination or were grossly untrue and certainly exaggerated to go unanswered. In the course of further remarks on future prospects, Sir Percival Bower expressed the hope that the Association, in conjunction with the technical organisations of the industry, would make a serious effort towards eliminating from the market in this country the cheap shoddy electrical appliances that were being sold to the public, because one accident, even if a small one, would do more harm than the spending of thousands of pounds in advertising could do good.

On the motion of Sir Duncan Watson, seconded by Mr. J. W. J. Townley, a cordial vote of thanks was passed to Lord Ashfield for his services during the past year. Votes of thanks were also passed to Lord Eltisley and Mr. H. C. Lamb.

Parliamentary News

(BY OUR SPECIAL REPORTER)

IN the House of Commons on March 21st Mr. Summersby asked the Minister of Transport if he could give an estimate of the saving of cost by carrying electric cables above ground instead of underground; and whether he was satisfied that this was sufficient to warrant the continuance of such a method in country places considering the effect on the landscape and the danger to aircraft.

Mr. Stanley said he assumed that his hon. friend had in mind the high voltage lines of the grid system. On the basis of the few lengths of 132,000-V underground cables which had been laid for experimental purposes, the cost of such cables could be taken as approximately ten times the cost of 132,000-V overhead lines, and the substitution of underground for overhead grid lines would be impracticable.

The Electricity (Supply) Bill

Last week Standing Committee C of the House of Commons considered the Electricity (Supply) Bill.

Mr. Thorp, who is in charge of the measure, moved an amendment to provide that where a person was convicted of having without consent used electricity for power purposes the Court might direct that such electricity should be charged at the rate charged for electricity supplied for lighting purposes. There was, he said, already a similar provision in several Bills.

On behalf of the Labour Opposition, Mr. Batey opposed the amendment. He said that the Bill already provided that a person convicted of the offence referred to was liable to a penalty not exceeding £5 and to a further penalty of 40s. for every day on which the offence was committed after conviction. But the promoters were not content with that, and now proposed to go back and charge a higher rate for a year.

The amendment was agreed to.

Mr. Thorp moved an amendment to give undertakers power to cut off the supply of electricity where they had reasonable grounds to believe that it was being used for power purposes. Mr. Geoffrey Peto objected to these " unnecessary and vindictive " powers, and Lt.-Col. Headlam, the Parliamentary Secretary to the Ministry of Transport, said that it was entirely a matter for the Committee to decide whether these additional powers should be given to undertakers. The Ministry was not in the least desirous that this amendment should be inserted. In view of the feelings of the Committee, Mr. Thorp did not press the amendment, which was negatived.

Mr. T. Smith moved an amendment to provide that " lighting purposes " should not include the use of electricity to operate a radio instrument, but it was agreed to try to find suitable words before the report stage, and on this understanding the amendment was withdrawn.

An amendment depriving undertakers of the power of recovering any sums due in respect of apparatus supplied on hire-purchase was carried, and, as it was felt that the amendment would make nonsense of the clause dealing with this matter, the whole clause (Clause 5) was deleted, as was also Clause 6, which gave power to undertakers to recover the cost of cutting off supplies.

The Committee adjourned until April 10th.

In the Courts

A KING'S Bench Divisional Court, consisting of the Lord Chief Justice and Justices Avory and Talbot, allowed an appeal by Messrs. John Mowlem & Co., Ltd., builders and contractors, from the decision of the Stipendiary at the South-Western Police Court holding that Mr. Alfred Lane, the district surveyor of Battersea, was entitled to receive from the appellants the sum of £476 10s. as the fees which he alleged to be due to him under the fifth schedule of the London Building Act, 1930, in respect of the generating station at Battersea, which was erected in accordance with plans (over 700 in number) submitted to the L.C.C. between 1929 and 1932

It was stated during the arguments that the building cost some millions of pounds. The question on the appeal before the Court was whether under the provisions of the Act of 1930 the respondent, Mr. Lane, was entitled to claim as district surveyor any fees from the appellant company in respect of the erection of the building, it being contended on their behalf that he was not so entitled.

At the conclusion of the argument the Lord Chief Justice said that the Court was of the opinion that the appeal should succeed, but owing to the importance of the question raised the reasons for that decision would be reduced to writing in a judgment to be delivered at a later date.

Alleged Valve Patent Infringement

In the Chancery Division last week before Mr. Justice Clauson, Mr. Heald moved, on behalf of the Mullard Radio Valve Co., Ltd., for an interlocutory injunction restraining Philip Kay, Ltd., Cannon Street, E.C., from infringing plaintiffs' wireless valve patents. He said that the defendants were willing to treat the motion as the trial of the action and submit to an injunction in the terms of the notice of motion with a slight variation. Defendants were to be restrained from infringing the plaintiffs' patents by importing or selling any American valves which infringed those patents. It had been agreed that the defendants would pay £5 by way of costs and that would be an end of the whole matter.

Mr. Aldous, for the defendants, said there would be no damages. He wished to state that the defendants had bought the valves in question in complete ignorance that they infringed anybody's rights.

The Radiovisor Appeal

On Tuesday last the House of Lords, consisting of Lords Tomlin, Russell of Killowen and Wright, delivered judgment in the appeal of Radiovisor Foreign & Colonial, Ltd., from the judgment of the Court of Appeal dismissing an appeal from the judgment of Mr. Justice Lawrence in the King's Bench Division, who after a trial lasting forty-three days dismissed the company's action against Radiovisor Parent, Ltd., claiming £200,000 damages and the return of 100,000 £1 shares. The claim was based on an allegation that the appellant company had been induced by fraudulent misrepresentation made by the agents of the Parent Company to enter into contracts for the purchase of certain foreign and colonial patent rights relating to the " Radiovisor " selenium light sensitive bridge, and Mr. Justice Lawrence held that the charges of fraud had not been made out and the Court of Appeal, after hearing arguments lasting twenty-seven days, affirmed the trial judge's decision.

Lord Tomlin, in the course of a long written judgment, said that he was satisfied that Mr. Justice Lawrence and the Court of Appeal were right in reaching the conclusion that there was no fraudulent misrepresentation proved, and he thought that the appeal should be dismissed with costs.

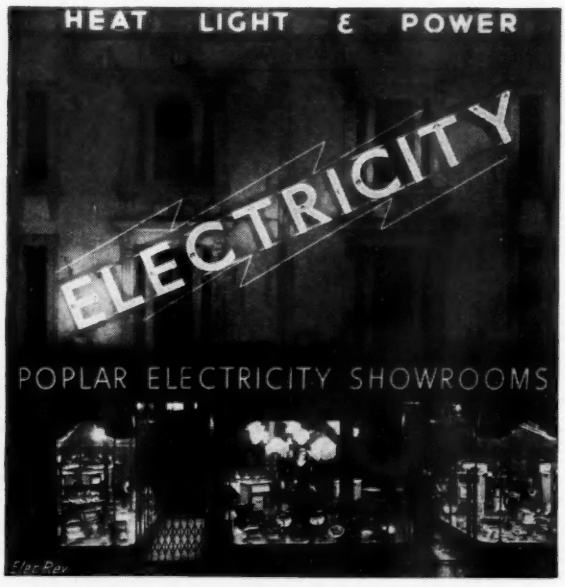
The other members of the Court concurred.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

New Showrooms at Poplar

The new showrooms of the Poplar Electricity Department in East India Dock Road were opened on March 19th. An old building has been reconstructed and the new premises include a showroom, basement and two floors equipped as general offices. The basement will be used as a general store, with a workshop and accumulator-charging room, the ground floor being a showroom in which is displayed a variety of domestic appliances, including cookers, fires, lighting fittings, &c. As our illustration shows there is a large centre display window, with two small side windows. The heating of the first-floor offices is by means of Benham "Electro-Vapour" radiators, and the second floor by tubular heaters. The electrical installation was carried out by the Electricity Department staff under the supervision of Mr. G. E. Jesson, power and heat engineer. The exterior neon signs were supplied and installed by Messrs. Maple & Co., Ltd. The showroom manager is Mr. A. H. Vincent. The borough electrical engineer (Mr. R. Illingworth) is shortly launching a scheme for supplying a 5- or 6-kW cooker with the necessary wiring and switchgear at a cost of 1s. per week and 0.6d. per kWh.



The new showrooms of the Poplar Electricity Department

An Irish Campaign

A novel five-day campaign was conducted in Dublin by the Irish Free State Electricity Supply Board commencing on March 12th. It comprised a series of lectures and cooking demonstrations under the title "Electric Cookery and Irish Foods" and the slogan for the occasion was "Irish Foods and a National Fuel." The organisers selected five subjects for 15-minute talks and obtained the services of well-known authorities as lecturers. At each lecture the hall was overcrowded, and on two days it became necessary to refuse admission because of overcrowding. The campaign was well backed up by special Press advertising, and each visitor was given an envelope containing an informative illustrated booklet (numbered in connection with a draw for an Easter cake), the daily programme, and an entry form for a competition involving the guessing of the weight of the before-mentioned cake—the three prizes being of an electrical character. At the hall an exhibition was arranged of Irish food products and electric cookers which can be hired from the Board.

Trade Prospects in Poland

Sir Eugene Ramsden, chairman of the trade mission which recently visited Poland, gave an interview to the Press on March 22nd when he outlined the work of the mission. He explained that the balance of trade between Poland and the United Kingdom was considerably in favour of Poland, and the object of the mission was to try to find out ways and means of increasing the exports of United Kingdom products and manufactures to Poland. All sections of the delegation had brought back a great deal of information which should prove useful to British industry, and it had paved the way to trade negotiations between the two Governments. Mr. W. G. Bass (Ferranti, Ltd.), who represented the B.E.A.M.A., stated that he had got into touch with the Polish Union of Power Stations which had promised to help to get British electrical appliances on to the market. Increased electrical trade with Poland could only be brought about by active co-operation with Polish electrical manufacturers. They were naturally anxious to protect their industry, but they had given the mission a list of electrical equipment which they did not manufacture, and this covered a very wide field.

Employment During February

Employment in the engineering industry during February showed a slight general improvement, but continued slack on the whole. According to statistics published in the *Ministry of Labour Gazette* the number of unemployed totalled 165,413, a decrease of 7,214 as compared with the preceding month, the percentage falling from 18.1 to 17.3. (In February, 1933, the figure was 27.6.) In the electrical engineering section the number of unemployed was 10,566, the proportion falling slightly from 11.8 to 11.7 per cent. (19.3 per cent. in February, 1933). In the electric cable, apparatus and lamp manufacturing group, the unemployment total increased to 15,800, or from 12.2 to 12.6 per cent. (18.2 per cent. in February, 1933), while the electrical wiring and contracting industry also showed a slight increase at 4,629, from 16.2 to 16.8 per cent. (19.3 per cent. in February, 1932).

Canadian Electrical Exports and Imports

There was a marked decline last year in the exports of electrical machinery and apparatus from Canada, the official returns showing a total of only £375,637, as compared with £1,063,414 in 1932. Of the total £124,790 is credited to the United Kingdom. A decline was also recorded in the imports of similar material into Canada, from £1,541,622 in 1932 to £1,049,783 last year. The bulk of the material came from the United States, that country supplying £879,090 of the total, as against £103,580 from Gt. Britain.

Irish Free State Electrical Imports

The imports of electrical machinery and cognate material into the Irish Free State during January last showed a slight improvement, having attained a value of £61,662 as compared with £58,533 in the corresponding month of 1933. From the appended table it will be seen that there was an increase in machinery, wires and cables and unclassified goods, but a decline in accessories and fittings and also in radio material.

	January. 1933	January. 1934
	£	£
Electrical machinery	14,877	16,371
Electric wires and cables	2,530	5,732
Electric lighting, accessories, fittings, and parts ...	4,426	3,751
Radio sets and parts	20,316	16,305
Other electrical goods	16,384	19,503
Totals	£58,533	£61,662

The Timber Trade

Imports of building and joinery woods are on the heavy side for the time of year, but the spot demand is increasing. In hardwoods considerable quantities of sawn mahogany are coming from British Empire countries, and less foreign and more British plywood also is arriving this year. The heavy shipments of oak from the United States have been bought cheaply. The hard and fancy woods other than mahogany are not in large request, but prices are steady because of the small stocks on the market.

An effective window display arranged by the Hotpoint Electric Appliance Co., Ltd., at Crown House, Aldwych, W.C.

A Lighting Equipment Demonstration

An interesting collection of lighting exhibits was demonstrated at a recent meeting of the North-Western Area branch of the Illuminating Engineering Society at Manchester. Following an introductory talk by Mr. C. W. Sully, president, short accounts of the following equipment were given: Auto-

matic Light Control, Ltd., control unit and corrected colour fittings; Benjamin Electric, Ltd.; "Saaflux" fittings; Chance Brothers, Ltd., pressed and coloured glasses; Everett Edgcumbe & Co., "lumen cube" photo-electric photometer; B.T.-H. Co., artificial sunlight lamp and gaseous discharge lamp (horizontal); Edison Swan Electric Co., turret floodlight; E.L.M.A., polar curve machine and model of floodlighted building; G.E.C., portable photometer and gaseous discharge lamp fittings; Hailwood & Ackroyd, Ltd., glassware; Holophane, Ltd., "Duo-Dome" refractor; Philips Lamps, Ltd., sodium gas discharge lamps; Siemens Electric Lamps & Supplies, Ltd., colour-corrected gas discharge lamp; Stafford & Leslie, Ltd., portable photo-electric photometer; Simplex Electric Co., fittings for gas discharge lamps and flame-proof mine lamps; and W. Parkinson & Co., iso-candle diagram model. There were also some gas exhibits.

Social Events

An enjoyable evening was spent in the Cordes' Hall, Sunninghill, on March 16th, when Mr. Arthur Cozens, electrical engineer and contractor, entertained his staff and their friends to a supper, followed by dancing, to celebrate his son's twenty-first birthday. A birthday presentation of a picture was made to Mr. Barry Cozens from the staff, and Mr. Arthur Cozens was presented with an illuminated address.

The first annual dinner of the Ipswich and District Electrical Association (I.D.E.A.) was held recently, Mr. H. E. Blackiston, borough electrical engineer, presiding. Mr. B. G. Drummond, general manager of the East Anglian Electricity Supply Co., Ltd., referred to the reductions made by Mr. Blackiston in the electricity charges and said it was difficult for his company to compete, but it was contemplating reductions, and though they might not be so spectacular as those made in Ipswich they would prove satisfactory. Mr. Blackiston stated that when the new charges in Ipswich came into force on April 1st Darlington would be the only town in the country with a cheaper supply. This Association was formed in 1933 with a membership restricted to manufacturers, distributors and electrical contractors having premises in the area of the Ipswich Corporation Electricity Department and its object is to further the development of electricity supply in Ipswich and district. The hon. secretary is Mr. H. Wintle.

The annual meeting and supper of the Metropolitan-Vickers Long Service Association was held in the staff canteen at the Trafford Park Works on March 19th, directors and officials of company attending. The members, who numbered 600, have had more than twenty-two years' service with the company. The M-V. male voice choir and orchestra provided a musical entertainment.

The Met.-Vick Long Service Association at their annual meeting and supper

Henley Cable for Brisbane

Messrs. W. T. Henley's Telegraph Works Co., Ltd., recently shipped to Brisbane, on two drums, a length of 1,000 yds. of 0.25 sq. in., three-core, 33,000-V screened S.L. type, double wire armoured under-water cable. The cable will be used for two crossings of the Brisbane River, each crossing being in one length without joints. The cable has special protection against attack by teredos or, at the shore ends, by termites. The protection against teredos consists of a lapping of brass tape on each lead-covered core, and the attacks of termites are guarded against by a special termite-resisting compound. The company is responsible for the laying and termination of the cable, which will form an important link in the Brisbane City Electric Light Co.'s system and which has a special feature in its construction. Three reinforcing strands of galvanised wire are built into the longitudinal interstices between the cores, thus providing a continuous lateral support for the cores throughout the length of the cable, together with great longitudinal strength. This construction enables anchoring grips to be used without any risk of flattening of the cores and considerable tension can be applied to the cable without being transmitted to the conductors. The cores were each provided with a seamless lead sheath applied by the Henley patent straight through lead press.

Shipping 33,000-V submarine cable to Brisbane from Henley's Works

The Model Railway Exhibition

The Model Railway Exhibition, organised by the Model Railway Club, will open on Tuesday next at the Central Hall, Westminster, S.W., and will remain open until the following Saturday.

E.D.A. (South Midland Area)

Councillor W. H. Phillips (chairman of the Derby Corporation Electricity Committee), in proposing the toast of the Electrical Development Association at the annual luncheon of the South Midland area branch in Birmingham on March 19th, urged that the adequate development of electricity needed improved advertising to meet the competition of gas and coal, and he suggested that henceforth the advertisements should be addressed to the women who looked after the practical side of the home rather than to the men. The weakness of the advertisements so far was that they did not get down to the facts that would appeal to the women. Sir William Ray, M.P. (executive chairman of the Association), in responding, stated that any suggestions on advertising policy would be carefully considered. Prizes for the area public speaking competition were awarded to Mr. A. H. Bentley (Nottingham), Mr. E. Didcot (Nottingham), Miss C. Robertson (Electric Supply Department, Birmingham) and Miss L. Millner (G.E.C., Birmingham).

A Lifting Handbook

"Modern Lifting" is a well-produced volume of 1,124 pages, on each of which are one or more illustrations, giving full information regarding the products of Herbert Morris, Ltd., and of apparatus associated with lifting. The book is divided into convenient chapters dealing with the design and application of cranes and material-handling mechanism, and the comprehensive index enables quick reference to be made to any duty, loading, or type of equipment of which particulars are required.

Local Exhibition

An electrical exhibition promoted by Power Management, Ltd., managing engineers for the electricity supply companies under the control of the Southern Areas Corporation, Ltd., was opened at Littlehampton, on March 19th, by Col. C. C. R. Murphy, chairman of the Council. Mr. S. H. Richards, general manager of Power Management, Ltd., informs us that reductions in the charges for electricity have been in force since the beginning of the year.

Association of Ex-Siemens' Men

This Association is holding a smoking concert at Gatti's Restaurant, King William Street, Strand, W.C.2, on April 13th, 1934. Mr. J. Snow Huddleston, M.I.E.E., Dagenham Dock, Essex, the hon. secretary, will be pleased to send particulars of the Association to any gentlemen qualified for membership.

A Mines Department Publication

The Secretary for Mines announces the publication of the 1934 edition of the reference book entitled "Coal Mines Act, 1911: Regulations and Orders relating to Safety and Health." The regulations and orders of a general nature, which were in force on January 1st, 1934, are collected together in this volume in a convenient form for the use of mine officials and others concerned with safety and health in mines. It is also a valuable reference book for mining students. The book also contains lists of "permitted" explosives, approved shot-firing apparatus, safety lamps, safety lamp glasses, breathing apparatus and smoke helmets, and, for the first time, a list is included of signalling bells, relays and magneto and battery

telephones which have been certified by the Mines Department as being intrinsically safe. The volume can be obtained, price 1s. 6d. net (by post 1s. 9d.), through any bookseller or directly from H.M. Stationery Office.

Trade Announcements

Messrs. Willis & Co. (Meritus), Ltd., have changed their name to Meritus (Barnet), Ltd. The policy and constitution of the company will remain unchanged.

Laurence, Scott & Electromotors, Ltd., has removed its Birmingham office to Borough Buildings, 72, John Bright Street, Birmingham. The telegraphic address and telephone number remain unchanged.

Messrs. Escott Bros., Ltd., electrical and radio engineers, 98, High Road, South Woodford, have opened new showroom premises at 66, High Street, Wanstead.

Messrs. A. P. Dean & Co. have removed to 9, Osborne Street, Colchester, and ask for catalogues of electrical accessories, motors, &c.

"Beeantee" Illuminations, Ltd., has removed to 88, Goswell Road, E.C. The telephone number and telegraphic address remain unchanged.

Mr. J. S. Plumtree, electrical engineer, has removed to 104, High Holborn, W.C. (Telephone: Holborn 1941.)

The Watliff Co., Ltd., has removed to Commutator Works, Morden Road, South Wimbledon, S.W.19. (Telegrams: "Watliff, Toot, London"; telephone numbers: Liberty 1181 and 1182.)

The address of Messrs. Fernand Espir, Ltd., is now Dominion Buildings, South Place, E.C.2. (Telephone: National 6961.)

E.D.A. Telephone Number Changed

The telephone number of the British Electrical Development Association has been changed to Temple Bar 9434.

New Electricity Showrooms

The Hoylake Urban District Council on March 28th opened a new electricity showroom in Albert Road, Hoylake.

Price of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, ETC.	Price, March 27th.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£40	—
a Ammonia, Muriate (large crystal) ... ,,	£38	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£19 15s.	—
a Potash Chlorate ... ... per lb.	3¾d. to 4¼d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac T.N. ... ... per cwt.	£4 18s.	—
a Sulphur Commercial ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3½d. to 3¾d.	—
a ,, Crystals ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d. nett.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil ... ... ,,	1/2 to 2/9	—
p Babbits Metal and Anti-friction Metals.—		
Grade I ... ... per ton net	£210	—
Grade II ... ... ,,	£143	£1 dec.
Grade III ... ... ,,	£68	£2 dec.
c Brass (rolled metal 2" to 12" basis) per lb.	7d.	—
c ,, Tubes (solid drawn) ... ... ,,	9d. to 9¼d.	—
c ,, Wire, basis ... ... ,,	7¼d.	—
c Copper Tubes (solid drawn) ... ,,	10d.	—
g ,, Bars (best selected) ... per ton	£62	—
g ,, Sheet ... ... ,,		—
g ,, Rod ... ... ,,		—
d ,, (Electrolytic) Bars ... ... ,,	£36	10s. dec.
g ,, ,, Sheets ... ,,	£35 10s. to £36	10s. dec.
d ,, ,, Wire Rods ... ,,	£42 10s.	5s. inc.
d ,, ,, H.C. Wire ... per lb.	7 1/16d.	1/16d. inc.
f Ebonite Rod ... ... ,,	1/3 to 1/6	—
f ,, Sheet ... ... ,,	1/3 to 1/6	—
n German Silver Wire ... ... ,,	2/5	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para fine ... ... ,,	5d.	—
i Iron, Pig (Cleveland No. 3) ... per ton	62/6	—
i ,, Wire galv. No. 1, P.O. qual.... ,,	£20	—
g Lead, English Pig ... ... ,,	£13	—
g Mercury ... ... per bot.	£10 15s. to £11	5s. inc.
c Mica (in original cases) small ... per lb.	6d. to 3/6	—
e ,, ,, medium ... ,,	4/- to 8/-	—
e ,, ,, large ... ,,	8/6 to 17/6 & up	—
p Phosphor Bronze, plain castings ... ,,	1/1	—
p ,, ,, drawn bars & rods ,,	11d.	—
p ,, ,, rolled strip & sheet ,,	11d.	—
p ,, ,, wire ... ... ,,	11¼d.	—
o Platinum ... ... per oz.	£7 15s.	—
d Silicium Bronze Wire ... ... per lb.	8¼d.	1/16d. inc.
r Steel, magnet, in bars ... ... ,,	7¼d.	—
n Tin, Block (English) ... ... per ton	£238 to £240	£1 10s. inc.
g ,, Wire, Nos. 1 to 16 ... ... per lb.	3/8	—

Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. R. Dennis & Co.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead and rubber, up to the time of going to press, are given in our "Business Notes" under the same heading.

Training for Salesmanship

From April 25th to 27th at the new E.A.W. premises, or at the E.L.M.A. premises, a training course of lectures is to be held for women demonstrators and saleswomen in the electrical industry. The course has been arranged by E.D.A., the E.A.W. and E.L.M.A. The programme is as follows:

Wednesday, April 25th.—Opening address by Miss Haslett, followed by Mr. A. C. Cramb on "Selling More Electricity," Miss E. M. Radloff on "Food and Diet," Miss D. Vaughan on "Planning Different Types of Public Demonstrations," and on "Demonstrations in Consumers' Homes."

Thursday, April 26th.—Mr. W. J. Jones on "Selling Electric Light," followed by Miss D. M. Noakes, on "How to Give Home Lighting Advice," a tour of lighting demonstrations at the Lighting Service Bureau, Mr. Elliott Stone on "Electricity Salesmanship," and practical selling demonstrations staged by the Demonstrators' Circle.

Friday, April 27th.—Mr. J. I. Bernard on "Electric Water Heating," followed by Miss Nora March on "Health and Cleanliness," Miss M. Partridge on "Plugs, Sockets, Flexibles and Wiring for the Home Installation," also an open discussion on matters arising out of the course, and dinner for demonstrators holding E.A.W. diploma.

Saturday, April 28th.—Visit to Ideal Home Exhibition.

A Birmingham Electric Supply Department Display

The accompanying illustration shows a section of the stand of the Birmingham Corporation Electric Supply Department

A water-heating display by the Birmingham Electric Supply Department

at the National Trades and Industrial Exhibition which is now in progress at the Bingley Hall, Birmingham. The Department's exhibits are devoted to domestic electrical apparatus and special features are being made of electric cooking and water-heating apparatus.

Wages in the Contracting Industry

The National Joint Industrial Council for the Electrical Contracting Industry has decided to continue the present rates of wages for a further year up to and including the first pay day in April, 1935. These rates are as follows: Grade A, 1s. 8¾d. per hour (including an addition of 5 per cent. and travelling allowance); Grade B, 1s. 5¾d.; Grade C, 1s. 4¼d.; and Grade D, 1s. 3¼d.

Recent Contracts

The Fraser & Chalmers Engineering Works of the General Electric Co., Ltd., has received two further orders for coal-washing plant operating on the "Chance" patent sand flotation process. The first order is for a washer capable of handling 190 tons of coal per hour in a South Wales coalfield. The second order is for a coal washer for Imperial Chemical Industries, Ltd., in connection with its hydrogenation plant. These orders follow nine months' successful operation in a Yorkshire colliery of the first "Chance" washer installed in this country.

The Marking of Imported Clocks, Etc.

The Board of Trade announces that an Order-in-Council was made on March 22nd under Section 2 of the Merchandise Marks Act, 1926, *viz.*: the Merchandise Marks (Imported Goods) No. 4 Order, 1934, requiring imported clocks, movements of clocks, clockwork movements, platform escapements and synchronous electric motors to bear an indication of origin. This Order, which will come into force on June 22nd, is being published and copies will shortly be purchasable from the Stationery Office, either directly or through any bookseller.

New Catalogues and Lists

Jackson Electric Stove Co., Ltd., 143, Sloane Street, S.W.1.—Particulars of a new range of inset fires.

Midland Electric Manufacturing Co., Ltd., M.E.M. Works, Barford Street, Birmingham, 5.—A pamphlet on the new 10-A ironclad switch and fuse combination.

Bruce Peebles & Co., Ltd., Edinburgh.—Specification No. 10 on standard open type d.c. motors and dynamos.

L. G. Hawkins & Co., Ltd., 30/35, Drury Lane, W.C.2.—A broadsheet advising the public to buy the "Supreme" cleaner from local retailers.

Babcock & Wilcox, Ltd., Farringdon Street, E.C.4.—Booklets forming reprints of articles on the new Barking power station and the Vatican power station.

Enfield Equipment Co., Ltd., 2, Trinity Street, Enfield.—A catalogue of automobile ignition components.

Modinstal Electric Co., 2, Oldham Terrace, High Street, Acton, W.3.—A catalogue of flexless electric irons and automatic controls.

William Sanders & Co., Falcon Electrical Works, Wednesbury, Staffs.—A complete catalogue of Sanders switchgear.

Higgs Motors, Ltd., Witton, Birmingham, 6.—A pocket stock list.

Brookhirst Switchgear, Ltd., Northgate Works, Chester.—A pamphlet on oil pressure circuit-breakers.

Falk, Stadelmann & Co., Ltd., 83/93, Farringdon Road, E.C.1.—Particulars of the "Servis" cooker.

Pickerings, Ltd., Globe Elevator Works, Stockton-on-Tees.—A comprehensive description and several leaflets on electric lifts.

The Runbaken Co., 280, Deansgate, Manchester, 3.—Particulars of the new "Testoscope."

Dissolution of Partnership

Shaw, Newhey & District Electrical Co., electrical installation contractors, 34, Rochdale Road, Milnrow, near Rochdale.—Mr. J. Meyckle and Hannah Pennington have dissolved partnership. Mr. Meyckle will attend to debts and carry on the business.

Bankruptcy Proceedings

T. A. J. Edmunds, formerly trading as "Essanee Radio & Electrical," 5, Lena Gardens, Hammersmith, and lately of 146, Uxbridge Road, W.—The public examination of this debtor was held on March 21st at the London Bankruptcy Court, the accounts showing total liabilities of £639 (ranking £340) and assets of £183. Debtor stated that he began the above business in 1932 with a partner who, however, retired in October of that year. They sold radio sets under hire-purchase agreements and experienced difficulty in collecting book debts. He further attributed his failure to lack of capital, bad seasonal conditions and the seizure of his stock by the landlord. The examination was concluded.

S. M. Shackleton, wireless engineer, 14, Colliergate, York.—Public examination, April 26th, at the Law Courts, York.

H. C. Mealing (Yorkshire & Lincolnshire Electric Development Co.), 73, Lawrence Street, York.—Application for discharge to be heard on May 1st at the Law Courts, York.

F. E. Kinzett (F. E. Kinzett & Son), wireless factor, 54, Fielding Road, Chiswick, W.—Last day for receiving proofs for dividend April 4th. Trustee, Mr. J. L. Poland, 29, Russell Square, W.C., Official Receiver.

E. E. Lucas, wireless and electrical engineer, 1a, Station Road, Plymouth.—Last day for receiving proofs for dividend April 10th. Trustee, Mr. A. N. F. Goodman, 11, St. Aubyn Street, Devonport, Official Receiver.

C. H. Fisher, electrical and wireless engineer, 3, New Road, Durrington.—Last day for receiving proofs for dividend April 6th. Trustee, Mr. H. T. Jones, 12, Rolleston Street, Salisbury, Official Receiver.

G. E. Palmer, wireless and electrical dealer, 1, Two Mile Hill, St. George, Bristol.—First and final dividend of 4½d. in the £, payable March 26th at 26, Baldwin Street, Bristol.

F. H. Thomas and **W. E. Evans** (Thomas & Evans), electrical engineers, Salubrious Chambers, Salubrious Passage, Swansea.—Supplemental dividend of 2¾d. in the £, payable March 26th, at the Official Receiver's Office, Government Buildings, St. Mary's Street, Swansea.

T. McKnight, electrical contractor and wireless dealer, 9, Tootal Road, Weaste.—Receiving order made March 19th on a creditor's petition.

T. Ward, radio and battery engineer, 7b, Richmond Street, Bridlington.—Receiving order made March 17th on debtor's own petition.

R. J. Abrahams, radio dealer, 13, Crossroads Estate, Thundersley.—Receiving order made March 19th on debtor's own petition.

S. M. Bjornsen, electrical engineer, 31, Pelham Street, Nottingham.—First meeting April 6th at 22, Regent Street, Park Row, Nottingham.—Public examination May 3rd at the County Court House, Nottingham.

A. E. Scott-Smith, electrical factor, Linden Lea, Brooklands Road, Brooklands.—Date fixed for proceeding with examination adjourned *sine die*, April 27th at the Court House, Manchester.

W. A. A. C. Robinson, electrical engineer, 10, Carnaby Street, Golden Square, W. First and final dividend of 9s. 7¼d. in the £, payable any day (except Saturday) at Bankruptcy Buildings, Carey Street, W.C.

V. Gray, wireless dealer, 4, Young Street, Doncaster.—First and final dividend of 11½d. in the £, payable March 27th at 14, Figtree Lane, Sheffield.

Private Arrangements

W. Little, 55, Seaside Road, Eastbourne, and at Bexhill-on-Sea, wireless dealer, &c.—At a meeting of creditors on March 16th, at Eastbourne, Mr. A. E. Orbell, 6 and 7, Old Steine, Brighton, submitted a statement of affairs which showed ranking liabilities of £1,225, all due to the trade. In addition, there were fully secured cash creditors for £2,292. The net assets were £2,228, leaving a surplus of £1,003. Resolutions were passed in favour of a deed of assignment being executed to Mr. Orbell, whilst a committee of five of the largest creditors was also appointed.

Ionlite, Ltd., 89, Scrubs Lane, N.W.10, electric sign manufacturers.—At the meeting of the creditors of the above, no statement of affairs was submitted, but the receiver stated that the net assets were £80. The unsecured liabilities amounted to £8,452. The company was incorporated in February, 1930, with a nominal capital of £15,000, and another company was formed for the purpose of financing it; there was an amount of £15,670 due to the latter company, the security held being hire-purchase accounts amounting to £17,000, but estimated to realise £10,863. Last year a debenture for £2,000 was issued to a director of the company in respect of cash advances and a second debenture was created in December last in favour of the financing company for £1,300. The holders of the latter debenture appointed a receiver shortly after the creation. It was further stated that an offer had been received to take over the business and to provide for the payment of a composition of 4s. in the £ in cash. It was decided that a committee should be appointed to investigate the offer and advise the general body of creditors as to the course to adopt. The creditors include: Metallic Seamless Tube Co., Ltd., £687; British Oxygen Co., Ltd., £160; Foster Engineering Co., Ltd., £255; Lancashire Dynamo & Crypto, Ltd., £255; Telegraph Condenser Co., Ltd., £240; Webbs Crystal Glass, Ltd., £178.

F. Kitchen, wireless dealer, Ffrances Passage, Lancaster.—The creditors herein met at Lancaster on March 16th, when the statement of affairs submitted showed liabilities of £1,468 and net assets of £160, leaving a deficiency of £1,307. It was pointed out that there were contingent claims under hire-purchase agreements for approximately £400. A resolution was passed confirming a deed of assignment already executed to Mr. R. A. Hargreaves, C.A., Lancaster, with a committee.

Company Liquidations

Freedy Accessories, Ltd., 86, Theobald's Road, W.C.1.—The statutory meeting of creditors of the above was held recently in London, when Mr. L. Friedentag, one of the directors of the company, presided. A statement of affairs as at March 15th, 1934, was submitted, showing liabilities of £1,180 and net assets of £479, leaving a deficiency of £701. The company was incorporated in September, 1930, with a nominal capital of £750. From September 17th, 1930, to December 31st, 1931, the turnover was £9,979, with a net loss of £42; in the two following years there were further net losses of £394 and £305. It was mentioned that the net losses arose after charging directors' fees of £840, £400 and £400 respectively. An offer of 5s. in the £ was made, but it was suggested that the amount should be increased to 10s. in the £. It was resolved that Mr. E. H. Hawkins, 4, Charterhouse Square, E.C.1, should be appointed liquidator, with a committee of inspection.

Magnacore, Ltd., 85, Alsen Road, Holloway, N.7, manufacturers of transformers and electrical accessories.—The statutory meeting of creditors of the above was held recently at the Institute of Chartered Accountants, Moorgate Place, E.C., when Mr. N. Moss, a director, presided. He stated that the shareholders had met and passed a resolution putting the company into voluntary liquidation, and had nominated Mr. F. F. Sharles, Salisbury House, London Wall, E.C., receiver for the debenture holders, as liquidator of the company. A statement of affairs was submitted showing liabilities of £6,540. The assets, which were estimated to realise £2,269, were charged to the bank in respect of an overdraft which totalled £2,993, leaving the bank to rank as unsecured creditors for £724. The balance of the liabilities comprised trade creditors' claims £4,059, and there were cash claims of £1,756. The deficiency as regarded creditors was £6,540. The issued share capital of the company was £442, so that there was a total deficiency as regarded contributories of £6,982. It was resolved to confirm the voluntary liquidation of the company with Mr. Sharles as liquidator.

B. N. B. Wireless, Ltd., Liverpool, Belfast, Dublin, and Manchester, radio manufacturers.—The statutory meeting of the creditors was held recently at Liverpool. Captain J. McCurdy, the managing director of the company, presided, and reported that the shareholders had passed resolutions for the voluntary liquidation of the company and had nominated Mr. F. Wall as liquidator. The statement of affairs showed ranking liabilities of £11,446, and net assets of £8,924, leaving a deficiency so far as the creditors were concerned of £2,523. The issued capital of the company was £2,977. Resolutions were passed confirming the voluntary liquidation of the company, with Mr. J. Airey, Liverpool, and Mr. A. Cripwell, Birmingham, as joint liquidators, together with a committee. The following are creditors: Ever-Ready Co. (Great Britain), Ltd., £1,500; E. K. Cole, Ltd., £1,000; Siemens Electric Lamps & Supplies, Ltd., £1,300; McMichael Radio, Ltd., £750; General Electric Co., Ltd., £800; Ferranti, Ltd., £550; Mullard Wireless Service Co., Ltd., £500; Chloride Electrical Storage Co., Ltd., £800; Pye Radio, Ltd., £350; A. C. Cossor, Ltd., £300; Edison Swan Electric Co., Ltd., £400.

London Electric Service, Ltd., 5, Denmark Street, Charing Cross Road, W.C.—Under the compulsory liquidation of this company accounts have been lodged showing liabilities of £4,626, assets of £883, and a deficiency of £5,995 with regard to contributories, the issued capital amounting to £2,252. The Official Receiver (who is also representing as liquidator) reports that the company was formed in May, 1932, to carry on the business of general and electrical engineers, contractors, manufacturers and dealers, and to manufacture and market sound equipment apparatus and theatre and cinematograph equipment generally. The failure is attributed to selling on the hire-purchase system equipment for which the company had to pay cash; also to lack of the necessary capital to facilitate the marketing of its inventions.

Ideal Radio Supplies (London), Ltd., 950, Romford Road, Manor Park, E.12.—At a recent meeting of creditors a statement of affairs prepared at December 31st last was presented, showing liabilities of £1,432, of which £1,255 was due to the trade; there were sundry creditors for £152 and a loan creditor for £25. The total assets were £348, leaving a deficiency of £1,084. The creditors resolved that the matter should be dealt with in compulsory liquidation.

Radio Electric Lamp Co., Ltd.—Meeting April 4th at Clayton Road, Hayes, Middlesex, to receive an account of the winding-up during the past year by the liquidator, Mr. J. E. Wright.

Nelson Electric Lamp Co., Ltd.—Particulars of claims by April 12th to the liquidator, Mr. W. J. Funnell, 180, Fleet Street, E.C.

Electro Magnetic Controls, Ltd.—Meetings, April 30th, at 16, John Dalton Street, Manchester, to receive an account of the winding-up by the liquidator, Mr. C. D. Britten.

Anglo Radio Co., Ltd.—Meetings, April 24th, at High Holborn House, High Holborn, W.C., to receive an account of the winding-up by the liquidator, Mr. J. L. Chubb.

Electricity Supply

Lighting, Domestic, Power

Amble (Northumberland).—LOANS.—The Urban District Council is to apply to the Electricity Commissioners for sanction to borrow £1,000 for the following purposes: Extensions, £125; hire-purchase wiring, £75; meters, £600; and services, £200.

Aylesbury.—ELECTRIC WASH-BOILERS.—The Town Council is to have electric wash-boilers installed in fifty houses in Oxford Road, the boilers to be hired from the Electricity Department at 3s. each per quarter.

Bedford.—EXTENSIONS.—The Electricity Department is to make mains extensions at Great Barford, Cardington, Sandy, Upper Caldecote, Wilstead, Ampthill, Ravensden, Elstow, Turvey, Potton and Stagsden.

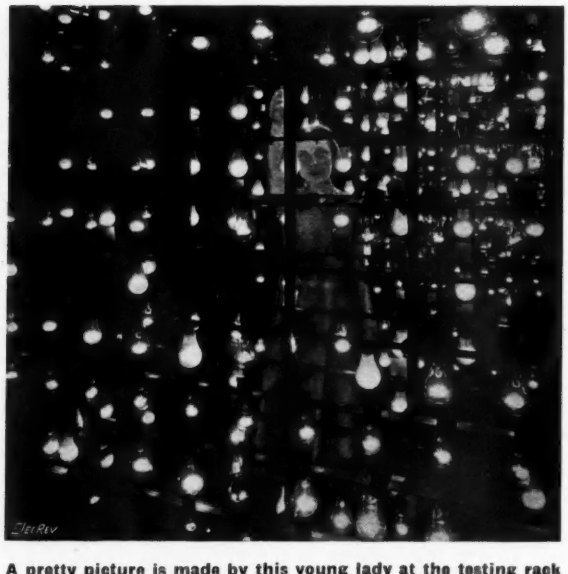
Binbrook (Lincs).—SUPPLY PROMISED.—The Grimsby Town Council has intimated that if there is sufficient demand for electricity a supply will be available in this parish next winter.

Blackpool.—LOAN.—The Electricity Committee has decided to apply for a loan of £24,000 to meet requirements in electrical services for the ensuing three years. Owing to the rapid growth of the department the last loan, which should have lasted three years, has sufficed for only two years.

Bridge.—EXTENSIONS.—The South-East Kent Power Co., Ltd., has informed the Rural District Council that a line is being constructed to supply the villages of Bridge, Littlebourne and Fordwich, with extensions to other parishes at a later date.

Brighton.—ELECTRICAL WATER PURIFICATION.—An electrical "ozone" plant is to be installed for the purification of the sea water at the proposed new swimming pool at Black Rock, Brighton.

Canada.—WATER-POWER RESOURCES.—The Dominion Water Power and Hydrometric Bureau of the Department of the Interior of Canada has issued its annual review of the water-



A pretty picture is made by this young lady at the testing rack of the Osram-G.E.C. lamp works

power resources of Canada, developed and undeveloped, as at February 1st, 1934. The bulletin contains the latest figures of available and developed water-power in each province, and deals also with current progress in development, the utilisation of water-power in the principal industries, and the past and future growth of water-power development. The total water-power resources of the Dominion are now estimated at 20,347,400 h.p. under conditions of ordinary minimum flow and 33,617,200 h.p. ordinarily available for six months of the year, equivalent to a total turbine installation of about 43,700,000 h.p. The present total turbine installation is 7,332,070 h.p., of which 270,210 h.p. was added during 1933. Copies of the bulletin may be obtained gratis from the High Commissioner for Canada, Canada House, Trafalgar Square, S.W.1.

OUTPUT DURING JANUARY.—The power output reached a record level in January, when production totalled 1,728,561,000 kWh. This total compares with 1,707,885,000 kWh in December and 1,396,661,000 kWh in January of last year. Power exports to the United States in January amounted to 100,485,000 kWh, as against 99,353,000 kWh in December.

Cardiff.—REDUCED CHARGES.—The Electricity Committee has agreed that all public and private consumers, exclusively for heating, should pay ¾d. per kWh throughout the year. In addition, a rebate of 10 per cent. on all accounts has been agreed upon for the June and September quarters of the year.

Ceylon.—HYDRO-ELECTRIC SCHEME REVIVED.—A proposal has been made that the Government should raise a loan of £1,000,000 in order to carry out the hydro-electric scheme which has been under consideration for many years. The Finance Secretary states that it is possible to raise a loan from the Colonial Development Fund free of interest for the first ten years if an undertaking is given by the local Government that the imported material for the construction and machinery are purchased from British sources.

Chester.—BULK SUPPLY.—As a result of the application which has been made for permission to supply electricity in bulk to the Hawarden Rural District Council, the Electricity Commissioners state that, on the facts before them they are not prepared to entertain the Corporation's application.

Chichester.—SUPPLY TO WITTERING.—The City Council has arranged to give a supply of electricity to the Wittering district, guarantees for £2,541 having been received. The scheme is to be redrafted by the engineer and submitted for approval to the Electricity Commissioners.

Connahs Quay.—REDUCTION CHARGES.—It has been decided to reduce the present power tariff to:—First 2,000 kWh per quarter, 2d. per kWh; second 2,000, 1½d. per kWh; third 2,000, 1¼d. per kWh; remainder 1d. per kWh.

Croydon.—EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £4,520.

Dorchester.—CHANGE-OVER.—The Town Council has applied for sanction to a loan of £9,886 for sub-station buildings, etc., in connection with the change-over.

Etchingham (Sussex).—SUPPLY IN JULY.—The Weald Electricity Co., Ltd., is taking steps to extend its overhead mains to this parish, and a supply will be available by about July.

Exeter.—HIRE-PURCHASE SCHEME.—The electrical engineer has been authorised to supply electric fires and other types of apparatus (which are not at present hired or offered for hire-purchase) upon terms suggested by him.

WATER-HEATING.—The Electricity Committee has decided that where consumers have more than one electric water-heater installed, a reduction of 10 per cent. shall be made in the combined rental.

Hanley (Staffs).—SUB-STATION.—The North-West Midlands Joint Electricity Authority is to erect a sub-station in Fenton Road.

Hull.—EXTENSIONS.—The power station is to be extended at a cost of £96,000.

India.—EXTENSIONS AT DELHI.—The authorities are considering schemes for the extension of electricity supplies to various villages in the vicinity of Delhi, in order to provide lighting facilities and power for cultivation purposes.

Ipswich.—SUB-STATIONS.—The Electricity Committee has obtained sites at Derby Rd., Barrack Lane, Woodbridge Rd., and Belvedere Rd., for the erection of sub-stations.

Isle of Man.—THE ELECTRICITY BOARD.—The Isle of Man Electricity Board has received 1,000 applications for electricity and 700 consumers have been connected up. The Board hopes to take over the supply in Laxey by the early part of April.

DOUGLAS ELECTRICITY BILL.—The Corporation is promoting a Bill for the purpose of extending its powers with regard to the provision of electricity services in the Isle of Man, and to bring its authority in line with certain rights exercisable by the I.O.M. Electricity Board. One clause in the Bill seeks to prevent the Corporation from being restrained by injunction in the Courts from using any particular site for the purpose of a generating station.

Japan.—ELECTRICAL PROGRESS.—Our Yokohama correspondent reports that at the end of 1932 there were 11,509,061 houses in Japan which had electric lighting. It is estimated that 38,248,300 lamps were in use with a maximum demand of 978,846 kW.

Kettering.—LOANS.—Sanction has been received by the Urban District Council to the borrowing of £14,000 for consumers' wiring installations (balance of loan of £48,000 for unspecified works) and of £550 for the purchase of property in Northall Street for the Electricity Department. The Electricity Commissioners have also sanctioned the borrowing of £1,056 for the provision of an electricity supply to East Carlton Hall and a proposed housing estate in the adjoining park.

STREET LIGHTING.—Application is to be made to the Ministry of Health for sanction to a loan of £4,300 for a scheme of central lighting for main thoroughfares in Kettering.

Kendal.—EXTENSION REFUSED.—The Commissioners have declined to grant an application by the Town Council for consent to supply electricity to premises in Windermere Road, outside the existing area of supply. The cables laid are only 60 ft. from the houses needing a supply, and the Corporation is taking further steps in the matter.

INDUSTRIAL TARIFF.—The Council has adopted a special tariff for factories which close down their own power plant from March to October and take their total load from the Corporation. The minimum charge has been fixed at 0.5d. per kWh until a review of the actual working can be made.

Kinmel Bay.—SUPPLY ARRANGEMENTS.—Negotiations between the Kinmel Bay Estates, Ltd., the Electricity Commissioners,

and the North Wales Power Co., Ltd., have now been concluded, and the power company is to supply the estate shortly.

London.—POPLAR.—The Electricity Committee is applying for sanction to borrow £63,554 for extensions to mains and sub-stations. In the scheme provision is made for a four-core cable for all extensions of network which is suitable for three-phase operation at a later date if desired. There is also provision for mercury-arc rectifiers, instead of motor convertors, at the sub-stations, which will enable them to run without attendance during night shifts and week-end working. It is necessary to provide for a further sub-station in the Emmett Street area, which at the present time is supplied from the High Street sub-station.

The Electricity Committee is to install dust-extraction plant at the Weston Street power station at a cost of £960.

BATTERSEA.—The Electricity Committee reports that in view of the increasing load on certain h.p. feeders it is advisable to transfer these feeders from the old switchgear at the electricity generating station to new switchgear in a larger rupturing capacity in the new switch house at Lombard Road. The estimated cost of providing four new switches and transferring the feeders is £4,134. The Committee is to provide electricity services to 160 premises at an estimated cost of £1,430. Negotiations have now been completed with Mark Mayhew, Ltd., who have agreed to take a supply for power and lighting purposes at the flour mills in Church Road. The cost of the work will be approximately £3,575.

Luton.—LIGHTING IMPROVEMENTS.—The Town Council is to apply for a loan of £3,100 for extending the electric street lighting.

Macclesfield.—LIGHTING CHARGE REDUCTION.—The Electricity Company of Macclesfield has reduced the charge for electricity for lighting from 5½d. to 5d. per kWh, and the Town Council is to approach the company for some concessions for consumers on the rateable-value system.

Murthly (Perthshire).—SUPPLY TO ASYLUM.—The necessity for the installation of a new electricity supply for Murthly Asylum, Perthshire, before the commencement of next winter was revealed at the County Council meeting at Perth. It was explained that the electricity supply had now completely broken down. The committee concerned had considered installing a new private system or taking a supply from the Grampian Electricity Company. It preferred the latter, and the cost in either case would be about £3,000. If the Grampian Company, however, cannot obtain wayleaves and give a guarantee by March 31st the committee may have to consider the question of a private supply. An agreement made with the Grampian Company guarantees an annual minimum payment of £250, that the company should provide duplicate transformers, and that alternative lines of supply should be available.

North Berwick.—ASSISTED-WIRING SCHEME.—The Town Council has sanctioned an assisted-wiring scheme and the hire of electric cookers, writes Mr. E. T. Pound, the borough electrical engineer. The assisted-wiring scheme is as simple as possible. The prospective consumer selects an estimate from a contractor and, if approved, pays the Electricity Department 10 per cent. of the estimated figure. The order is then passed to the contractor by the Department. The consumer than pays nine further 10 per cent. instalments over a period of three years. Alternatively, he may continue the payment by the addition of 2d. per kWh to the ordinary prepayment-meter tariff. A minimum return is required from this alternative, which limits the period of repayment to six years. The cooker hire charge is to be one-seventh of the cost.

Northern Ireland.—ELECTRICITY BOARD DEVELOPMENT.—The Electricity Board of Northern Ireland announces that it is taking over ten more local undertakings in Northern Ireland. The transfers, in all cases resulting from private negotiations, affect the undertakings of Ballynahinch, Banbridge, Castlewellan, Cookstown, Kilkeel, Newcastle, Portadown, Rathfriland, Tandragee, and Warrenpoint. Up to the present the Board has acquired, since the beginning of the year, the undertakings of Donaghadee, Hilltown and Poyntzpass, serving a total of 300 consumers. The Board now has 9,200 consumers, which is nearly three times as many as at the end of 1932. The number of cookers in use rose from 270 at the beginning of 1933 to 1,500.

Norway.—A POWER EXPORT PROJECT.—At a recent conference in Stockholm a Norwegian electrical engineer, M. Johanssen, drew attention to a project to utilise the water power resources of Norway, estimated at 13 million h.p., in the generation of electrical energy for transmission to the Scandinavian countries and to Germany. Although the last-named country, Denmark and Southern Sweden could not at present absorb increased supplies, the scheme was, he considered, quite a practicable one and a syndicate has been formed to draw up a detailed scheme. In view of the fact that the annual consumption per inhabitant only amounts to about 400 kWh in Southern Sweden and 150 kWh in Denmark, whereas it had already reached a total of 1,200 kWh in Norway, not including the power used in the electro-chemical industries, M. Johanssen felt convinced that the project would eventually be realised.

Painswick.—SUPPLY SOON.—The West Gloucester Power Co. has commenced operations for supplying electricity to Painswick.

Portland.—WATER-HEATING TARIFF.—The Electricity Committee has adopted a special tariff of ¾d. per kWh for night water-heating.

LOANS.—The Electricity Committee has obtained sanction to borrow £2,300 for mains and services, £700 for meters and £1,000 for electrical apparatus.

PROPOSED PRICE REDUCTION.—The Electricity Committee is to consider the question of reducing the "unit" charge on the "size-of-house" tariff from 1½d. to 1d. in order to encourage cooking and water-heating.

Russia.—TRANSCAUCASIA.—Speaking at the recent Seventeenth Party Congress in Moscow, the chairman of the Council of People's Commissars of the Transcaucasian Republics stated that the Transcaucasian Federation had made great progress during the first Five-Year Plan and that electrification would play a large part in the reconstruction of the national economy during the second Five-Year Plan. The work would include the completion of the Rionges power station with a capacity of 48,000 kW, and subsequently the Knakirges (88,000 kW) power station; the completion of the Tkvarchelsk power plant with a capacity of 48,000 kW; a hydro-electric station in Khram; the Gumushsk station with a capacity of 140,000 kW; and the Terter hydro-electric power station.

Seaham Harbour.—WIRING COUNCIL HOUSES.—The Housing Committee is to obtain tenders for electric wiring in 158 Council houses.

LOAN.—The Electricity Committee is seeking sanction to a loan of £3,000 for a hire-purchase scheme.

Southend-on-Sea.—MAINS AND EQUIPMENT.—Mr. A. C. Johnson, the borough electrical engineer, informs us that an expenditure of £15,685 on mains and £5,437 on equipment was approved by the Town Council during February and March.

Stockton.—STREET LIGHTING.—The recent experimental lighting of Stockton High Street, half with gas and half with electricity, has brought from the members of the local Chamber of Trade a vote in favour of electricity. At their meeting on Tuesday night last the Chamber decided to ask the Corporation to extend the electric lighting to the whole of the street, as it had proved much more satisfactory than gas. Stockton High Street is one of the widest and longest in the country.

Stoke-on-Trent.—CHANGE-OVER.—The Electricity Committee

Clyde Valley Extensions

BEFORE a Parliamentary Commission in Glasgow last Friday Clyde Valley Electrical Power Co., Ltd., applied for additional powers, including the extension of its area of supply and an increase of certain investment powers already possessed by the company. There was opposition to the Order by the Electrical Power Engineers' Association, which desired the insertion of a clause providing for compensation being given in the case of any employés who might be displaced by the operation of certain clauses of the Order. Mr. T. M. Cooper, K.C., for the promoters, explained that for the most part the clauses of the Order dealt with matters which in the case of an ordinary limited liability company would be dealt with by special resolution passed at a meeting of shareholders. It was really because the Clyde Valley Company was a statutory company that steps which would be a matter of domestic concern under ordinary circumstances had to be taken in this way. Under the Clyde Valley Act, 1912, they had power to take shares or lend money to sundry undertakings to establish factories or other works within the area. The section provided that the amount so subscribed or lent by the company should not at any one time exceed £75,000, and the purpose of the present Order was to raise the maximum to £200,000. He explained that the company's subscribed capital was £2,900,000, and capital expenditure amounted to £4,000,000.

The view of the promoters was that having regard to the change in the value of money, particularly in relation to constructional work, and the great expansion which had taken place, the financial adjustments that were being effected by this Order should appropriately be accompanied by an increase of from £75,000 to £200,000, which was actually in a smaller ratio to the existing capital than the ratio which prevailed in the 1912 Order. The ratio for £200,000 was one-fourteenth, as compared with the proportion one-twelfth which was authorised in 1912.

Counsel said it was proposed to extend the company's area of supply in Lanarkshire and to a certain small extent in Dumbartonshire. The whole explanation for this extension of area was to be found in the fact that agreements had been arrived at with Lanarkshire County Council for the giving of supplies in or near those areas. No objection was raised, and it was necessary, or at least highly desirable, that the company's area for supply should be extended in coterminous area with the regions which they were operating in conjunction with Lanark County Council.

Evidence having been heard, the Commissioners found the preamble proved, subject to a clause being inserted protecting the interests of employés who were members of the Electrical Power Engineers' Association.

is to change over the supply in the Newcastle Street district at Burslem at a cost of £1,750.

NEW EQUIPMENT.—The Electricity Committee is to lay new feeders at Longton (£625) and from the power station to the Empson Street sub-station at a cost of £3,600. Mains and equipment in connection with a sub-station at Hartshill are to be provided at a cost of £2,550, and the Committee is to extend mains at Wolstanton at a cost of £1,500.

Sunderland.—OVERHEAD LINE.—The River Wear Commissioners have granted permission to the North-Eastern Electric Supply Co., Ltd., to place a h.p. electric cable over the Wear in the vicinity of North Biddick Colliery.

United States.—MONTANA DAM EQUIPMENT.—The electric motor equipment for dredging service in connection with the projected dam across the Missouri River in Eastern Montana will shortly be built by the General Electric Company, New York, says *Reuter's Trade Service*. The equipment will cost over $750,000, and will include twenty-one 2,500-h.p. main pump motors, five 700-h.p. cutter motors, and five 150-h.p. winch motors, all of the wound-rotor type, as well as the necessary control apparatus. The motors will be used to equip four dredges, four floating booster stations, and four land stations. The dredges will be employed by Army engineers to move about 1,325,000 tons of material from the bed of the upper Missouri River. It is estimated that the entire cost of the construction work on the new dam, which will be carried out in stages over four years, will be in the neighbourhood of $59,000,000.

Uttoxeter.—SUPPLY TO NEWBOROUGH.—The Newborough Parish Council has informed the Rural District Council that the majority of the inhabitants desire a supply of electricity. The Trent Valley and High Peak Electricity Co. states that a supply will be afforded if a sufficient number of consumers are obtained.

Traction

Glasgow.—TROLLEY-BUSES.—A Provisional Order, promoted by the Corporation, under which powers are sought, among other things, to provide, equip, and maintain trolley vehicles, has been the subject of an inquiry before a Parliamentary Commission at Glasgow. Lord Meston was chairman. Mr. T. M. Cooper opened the case for the promoters. He said that already twenty-two English municipalities were operating trolley vehicle systems. Dealing with running costs, counsel explained that Glasgow Corporation transport undertaking was in possession of Pinkston power station, an independent source of generation which enabled it to supply power at the exceptionally low figure of 0.305d. per kWh.

The first witness for the Corporation was Mr. L. MacKinnon, general manager of the transport department. Cross-examined by Mr. Graham Robertson, who represented the Scottish Motor Traction Co. and other objecting bus companies, Mr. MacKinnon stated that the difference in cost between running buses and trolley vehicles was between ½d. and ¾d. a mile. If they ran railless vehicles they could reduce the running costs by nearly 2d. per mile. Bailie Alex. McLean, chairman of the Transport Committee, also gave evidence in support of the Corporation's application. For the bus companies, Mr. Muir Wilson said the Traffic Commissioners had brought order out of what was chaos, but all the good work that had been done would be undone by the unrestricted running of trolley vehicles which did not come under the jurisdiction of the Road Traffic Act.

In the course of the hearing Mr. Graham Robertson made an offer to the Corporation which would enable it to abandon the tramcars. His clients, he said, would undertake to provide all the necessary bus transport and to do it at a profit. Mr. McLagen, secretary of the Society of Motor Manufacturers and Traders, gave evidence for the objectors in connection with the building of trolley vehicle bodies. The Commissioners found the preamble dealing with trolley vehicles proved, with certain amendments. The Corporation will be allowed to run trolley vehicles on tramway routes, with the exception of the route from Hillfoot to Milngavie, where tramways have never been run. The Corporation, however, will be prohibited from manufacturing any part of the trolley vehicles. The Commissioners also deleted the clause authorising the Minister of Transport to make a Provisional Order which would permit of the Corporation running trolley vehicles on routes other than tramway routes.

London.—NEW OSTERLEY UNDERGROUND STATION.—A new station situated on the Great West Road at Osterley was opened to traffic on March 25th, and the station at Thornbury Road has been closed. The new station is of modern design, constructed in multi-coloured bricks with a sign tower, surmounted by a concrete and glass lighting beacon. The height of the tower and beacon is about 70 ft. above the level of the Great West Road. An illustration appears on page 451.

Northern Ireland.—ELECTRICAL SIGNALLING ON RAILWAYS.—In connection with the Railway Bill in the Northern Ireland House of Commons, the following clause was included when the Bill passed through the committee stage on March 22nd: "A railway company may, with the approval of the Ministry, operate its signals and railway points associated with such signals by means of electrical energy, and any authorised undertakers within the meaning of the Electricity (Supply) Acts (Northern Ireland), 1882-1933, may, by agreement with the railway company and with the approval of the Ministry, supply electrical energy for that purpose for use within or without their area of supply. This section shall have effect notwithstanding of provisions of Section 5 of the Electric Light Act, 1909, as amended by Section 41 of the Electricity (Supply) Act (Northern Ireland), 1931."

Traffic Signals.—The Wallsend-on-Tyne Town Council is negotiating with the County Council with a view to having automatic traffic signals installed at the junction of the Coast Road and Station Road, and the Darlington Town Council has appointed a sub-committee to go into the question of erecting automatic traffic signals in various parts of the town.

Speaking at a City of London Corporation meeting, Mr. John Stropher, acting chairman of the Rates Finance Committee, said that the traffic signals in the City had cost £20,000 during the last three years.

Communications

India.—BROADCASTING IN MADRAS.—Mr. V. A. M. Bulow, of the British Broadcasting Corporation, whose services have been placed at the disposal of the Madras Government in connection with a broadcasting scheme, has arrived at Madras to take over his duties.

Jugo-Slavia.—RADIO-BELGRADE REMOVES.—Something like a record in the rapid moving of a complete wireless transmitting station was accomplished when the Marconi broadcasting station at Belgrade was dismantled, transported to a new site, re-erected, and tested within five days. The old Radio-Belgrade was situated in the centre of the city, and it was decided to move the entire transmitting plant to Makis, 10 km. from Belgrade.

Roumania.—NEW BROADCASTING STATIONS.—Technical details are now available of the two new transmitters which the Roumanian Broadcasting Company has recently ordered from the Marconi Company. One has an aerial power of 150 kW, and the other a power of 20 kW. Both incorporate "series modulation," ice-melting plant for the "T" aerial, and specially developed water-cooled transmitting valves. The 150-kW transmitter is adaptable to operate on any wavelength between 1,030 and 2,140 metres, and its power may be increased at a later date to an aerial input of 300 kW. The transmitting characteristic shows a substantially flat frequency response between 30 and 10,000 cycles, and maximum modulation up to 95 per cent. can be arranged.

The aerial masts of the new Radio Belgrade station, which has been removed to Makis, ten kilometres from the capital

The transmitting circuits provide for a two-stage high frequency amplifier modulated on the series modulation system by means of a three stage acoustic frequency modulator. The modulated output is amplified by means of a single power amplifier with six high-power water-cooled valves arranged in a push-pull panel circuit. The transmitted frequency is stabilised by means of a high precision valve drive followed by a harmonic selector and high-frequency amplifier and isolator stages. The power for the station will be generated by three Diesel engines driving three-phase alternator combinations, rectified by Brown-Boveri six-phase steel-cylinder mercury-arc rectifiers. One alternator is a reserve.

The 20-kW station is now temporarily in operation at Bod until the 150-kW transmitter is completed, when the smaller transmitter will be transferred to a new site to work on another wavelength.

Scotland.—TELEPHONE CABLE TO MULL.—The laying of the telephone cable from Oban to Mull was commenced on March 21st after the arrival of the cable ship *Alert*, off Ganavan Bay, north of Oban. The shore end of the new cable was landed at Ganavan where the existing telegraph cable is located. Afterwards about half a mile of telephone cable was laid. The distance from Ganavan to Mull, where the other end of the cable is to be taken, is over ten miles. Following this a considerable amount of land line will be laid over the mainland of Mull.

South Africa.—ANOTHER NEW BROADCASTING STATION.—The African Broadcasting Company has decided to erect a new wireless station at Grahamstown. A 10-kW transmitter has been purchased—a replica of the one recently opened at Cape Town. The new station will cost between £20,000 and £25,000.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—PERTH.—April 19th. Western Australian Government Electricity Supply. Boiler house equipment, one 25,000-kW turbo-alternator and e.h.p. and l.p. switchgear. (February 2nd.)

BRISBANE.—June 8th. City Council. Traction sub-station equipment. (A.Y. 12283.)*

Dalkeith.—March 31st. Town Council. Various works, including electrical, at eighty-eight houses. Schedules from Morham and Brotchie, surveyors, 29, Hanover Street, Edinburgh; tenders to J. C. Sturrock, Town Clerk, Municipal Buildings, Dalkeith.

Dover.—April 18th. Corporation. Cable, distribution lines, &c. (March 23rd.)

Dundee.—Electricity Department. April 5th. A.c. meters for the year ending May 15th, 1935. (March 16th.)

Egypt.—CAIRO.—April 7th. Public Works Ministry. Electric lamps, accumulator parts and porcelain insulators. (A.Y. 12287.)*

Epsom.—April 5th. Electricity Department. E.h.p. switchgear, metering equipment, transformers, e.h.p. cables, and mercury-arc rectifier equipment. (March 16th.)

Halifax.—April 14th. Corporation. Traffic control signals. (See this issue.)

India.—TRAVANCORE.—June 4th. Government Electricity Department. Turbines, generators, switchgear, transformers, &c. (February 9th.) Date extended from May 7th.

Inverkeithing.—April 3rd. Town Council. Various works, including electrical, at twenty houses at Spittalfield. Specifications, &c., from R. H. Motion, architect, Union Bank Chambers, Dunfermline (deposit £1 1s.); tenders to J. R. Menzies, Town Clerk.

Lanark.—April 3rd. County Council. Various works, including electric lighting, in connection with the erection of 200 houses. Mr. P. C. Smith, County Housing and Town Planning engineer, 13, Clydesdale Street, Hamilton.

London.—GREAT WESTERN RAILWAY.—April 5th. Electrical wires, cables, lamps, &c. (March 9th.)

New Zealand.—WELLINGTON.—Posts and Telegraphs Department. April 18th. 1,000 switchboard plugs and 2,500 24-V switchboard lamps. (A.Y. 12218.)*

April 30th. Eighteen double-pole, single-throw contactors. (A.Y. 12250.)*

May 7th. Thirty-seven moving-coil milliammeters and one voltmeter. (A.Y. 12272.)*

Public Works Department. May 29th. One 33-kV oil-immersed circuit-breaker. (A.Y. 12276.)* Three single-phase potential transformers. (A.Y. 12274.)*

June 26th. Battery-charging equipment. (A.Y. 12273.)*

May 8th. 6-V secondary batteries. (A.Y. 12244.)*

May 1st. Transformer oil drying and testing apparatus. (A.Y. 12252.)*

May 22nd. Battery-charging equipment. (A.Y. 12249.)*

June 5th. 50-V storage battery and charging equipment. (A.Y. 12245.)*

Northern Ireland.—BELFAST.—April 6th. Electricity Department.—Transformers and e.h.p. switchgear. (March 9th.)

April 6th. Improvement Committee. One 50-b.h.p. three-phase 400-V induction motor with power factor correcting device and complete with switchgear. Town Clerk (deposit £1 1s.).

Rosslynlee.—March 31st. Midlothian and Peebles District Asylum. Various articles, including electrical fittings, for six months. Forms of tender from, and offers to, C. L. Addison-Smith, clerk and treasurer, 19, Heriot Row, Edinburgh.

South Africa.—DURBAN.—April 13th. Corporation. Telephone cables. (A.Y. 12289.)* 1,000 bobbin insulators and 200 g.i. double-pole brackets. (A.Y. 12286.)* Telephone materials. (A.Y. 12290.)*

CAPE TOWN.—April 18th. Electricity Department. Power and telephone cables. (A.Y. 12299.)*

JOHANNESBURG.—April 19th. City Council. Two 400-kVA transformers. (A.Y. 12297.)*

PORT ELIZABETH.—April 12th. Municipality. Cables, transformers, motors and fans. (A.Y. 12285.)*

May 4th. Government Supplies Board. Four-cord circuit repeaters. (A.Y. 12298).*

Stoke-on-Trent.—April 11th. Electrical Engineer's Department. Overhead transmission lines. (March 16th.)

Tredegar.—April 10th. U.D.C. Pole lines, underground cables and sub-stations and equipment. (See this issue.)

Warrington.—April 16th. Electricity Department. Transformers. (See this issue.)

*Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Barking.—Corporation. Accepted. Electrical installation at Bifrons school.—Harland & Wolff, Ltd.

Bournemouth.—Pavilion Committee. Accepted. Electrical fittings and equipment for pavilion stage (£825).—Aish & Co.

Carlisle.—Corporation. Street-lighting contract for the current year.—Metropolitan-Vickers Electrical Co., Ltd.

Dorchester.—Town Council. Accepted. Cables (£1,668).—Johnson & Phillips, Ltd. Feeder pillars (£201).—Lucy & Co., Ltd. H.p. switchgear (£348).—British Thomson-Houston Co., Ltd. L.p. equipment (£300).—English Electric Co., Ltd. One 150-kVA transformer and one 700-kVA transformer (£325).—Electric Construction Co., Ltd.

Faversham.—Town Council. Accepted. Cable (£261).—W. T. Henley's Telegraph Works Co., Ltd.

Hoylake.—U.D.C. Accepted. One 2,000-kVA group of transformers.—General Electric Co., Ltd.

Kettering.—U.D.C. Accepted. E.h.p. and l.p. lead-covered cables for the year ending March 31st, 1935.—Union Cable Co., Ltd.

London.—STOKE NEWINGTON.—Electricity Committee. Recommended. Supplies for twelve months. L.p. cables (£1,310).—Metropolitan Electric Cable & Construction Co., Ltd. Electric kettles.—Bulpitt & Sons, Ltd. Meters.—Measurement, Ltd.; Aron Electricity Meter, Ltd. Wash-boilers.—Revo Electric Co., Ltd.

ST. PANCRAS.—Contracts and Stores Committee. Recommended. Electrical installation at Whidborne Buildings (£342).—Sims & Sims.

FULHAM.—Electricity Committee. Recommended. Coal-conveying plant (£2,070).—Naylor Bros., Ltd. Switchboards (£296).—Johnson & Phillips, Ltd. Gas-washing plant (£3,700).—Alfred Herbert, Ltd.

L.C.C.—Housing Committee. Accepted. Wiring further blocks of dwellings in the Baker's Alley area (£293).—Buchanan & Curwen, Dtd.

Forthcoming Events

Institution of Electrical Engineers.—(*London Students' Section*).—Friday, April 6th. Institution, London. 6.15 p.m. "Power Signalling at Paddington." Mr. P. J. Jacobs. (*North-Eastern Students' Section*).—Friday, April 6th. Armstrong College, Newcastle-on-Tyne. 7.15 p.m. Annual general meeting and short paper night.

Association of Mining Electrical Engineers.—(*West Wales Branch*).—Saturday, April 7th. Y.M.C.A., Swansea. Discussion on H.M. Electrical Inspector of Mines' Report for 1933. (*Kent Sub-Branch*).—Saturday, April 7th. Annual meeting and dinner.

Electricity Companies and Compensation Water

A SELECT Committee of the House of Commons, presided over by Sir Hy. Jackson, gave consideration last week to clauses in the Cardiff Corporation Bill relieving the Corporation of part of the obligation to send compensation water down the River Taff from its reservoirs. The clauses were opposed by the South Wales Electric Power Co. and the Merthyr Electric Traction & Lighting Co.

Mr. Tyldesley Jones, K.C. for the Corporation, said the demand for water was increasing and the Corporation asked to be allowed to reduce compensation water sent down the river from 7¾ million gallons to six million gallons daily. The South Wales Co. said in its petition that it had a generating station between the River Taff and the Taff Vale Railway and relied upon the river for large quantities of water. His comment on that was that the generating station was at a point on the river where compensation water formed a very small part of the total flow. Moreover, before 1927 the company had only four million gallons a day in compensation water and under this Bill there would be six million gallons. The station was erected in 1903.

Dealing with the Merthyr Company's petition Counsel said that that company alleged that any diminution in the volume of water would seriously diminish the output of its generating stations. The important fact was that in 1928 and 1931 the company erected generating stations for which the consent of the Electricity Commissioners was sought. The Corporation objected and gave notice of its intention to apply to Parliament for a reduction of compensation water. Correspondence and conferences followed, and although the Electricity Commissioners eventually gave consent it was with the qualification that that consent was without prejudice to the position that might arise if and when the Cardiff Corporation applied to Parliament for repeal or amendment of the clauses relating to compensation water.

After a conference it was announced that Glamorgan County Council and other public bodies had agreed with the promoters that there should be no diminution of compensation water when the flow of the river fell below 7¾ million gallons and that the Corporation should discharge water in excess of six million gallons whenever necessary to make up the flow to 7¾ million gallons. Mr. Craig Henderson agreed to accept this clause subject to his clients having a right to inspect gauges.

The Committee allowed the Bill to proceed subject to this amendment.

Notes

An E.P.E.A. Dinner

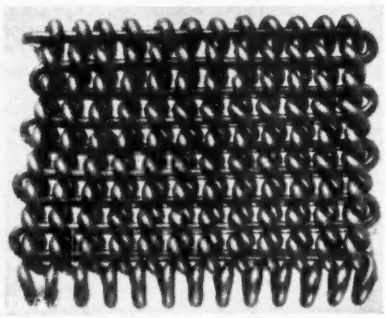
At the fourteenth annual dinner and reunion of the Electrical Power Engineers' Association (London Western Section), held last Saturday, Mr. S. J. Watson, of the Central Electricity Board, proposing the toast of the Association, referred to the amazing increase in the output of electricity during the last twenty-five years. Dealing with the grid, he said that in the South-East England area there were 1,000 miles of primary overhead lines. Trading in the area started on January 1st, and the anticipated maximum demand was 1,450,000 kW. Mr. Watson said that the reduction in staffs—particularly in the case of technical men—was being undertaken slowly, and Mr. Toynbee, president, in responding, said that he was glad to know that this was to be the policy of the Board, as they viewed the reduction in the staffs with great apprehension. Mr. Watson, in his speech, also mentioned the work of E.D.A., and said that in many cases the public were more electrically minded than the undertakings, which often did little or nothing to encourage the use of electricity. "Our Section and Our Chairman" was proposed by Mr. W. V. Cooper, and the chairman, Mr. A. W. Nunn, responded.

Seaham Harbour Goes One Better

Interruptions of supply by birds are not uncommon occurrences, but at Seaham Harbour recently the Electricity Committee reported that a section of the public lighting was put out of action owing to an old bird-cage having been thrown on to the overhead wires.

Tube Weaving and Welding

The accompanying illustration indicates the manner in which electric welding facilitates the building up or fabrication of metal parts in a way that is otherwise either impossible or extremely difficult to perform. Steel tubes are made by Tube Products, Ltd., Oldbury, by a process which is claimed to be unusual both in respect of the design of the welding machines and the qualities of the tubing which they produce. Made of cold rolled strip, the tube surface is perfectly smooth all over, the only visible trace of the weld being a blue mark, which in no way interferes with any subsequent finishes applied to the steel. The tubing is made within very fine manufacturing limits, and concentricity is not affected by the weld. The coil of tubes illustrated was woven by T. D. Norris & Sons, Erdington, Birmingham, from $\frac{3}{8}$ in. by 16 gauge electrically welded steel tube of standard quality. The coil has in it twelve lengths of tube 4 ft. long and nine lengths 20 inches long, making 63 ft. in all. The tubes have been woven and welded so as to form a coil with a continuous full bore and of overall dimensions 18 in. by 14 in. by 2 in. The coil has been tested to a pressure of 80 lb. without revealing any leak.



Woven welded tubing

The Welding of Steel Structures

The issue by the British Standards Institution of B.S.S. No. 538 for the metal arc welding of steel structures is prefaced with a note emphasising that the requirements must be regarded as being tentative only, and it is intended to review the Specification at an early date in order that its requirements may be brought up-to-date. The principal features covered are quality of material, methods of making welded joints, permissible working stresses, workmanship, mechanical tests on welded joints, and supervision. A complete specification for covered electrodes of a quality appropriate to the class of work covered by the Specification is given in one appendix. Two further appendices deal in full with methods of making all-weld metal test pieces and the method of testing welded joints respectively, and a fourth appendix is devoted to recommendations on the design of welded structures, which are of a somewhat elementary character, but it is anticipated that as experience is obtained they will be amplified and made more comprehensive. Copies of this Specification (No. 538-1934) may be obtained from the British Standards Institution, 28, Victoria Street, S.W.1, price 2s. 2d. post free.

H.M.V. Household Appliances

At a demonstration of the first products of H.M.V. Household Appliances, Ltd., at the Savoy Hotel on Tuesday, Mr. B. Mittell, chairman, explained that, while the first models of H.M.V. refrigerators will be manufactured in the United States, it is intended in due course to make them at the Hayes factory. Mr. R. C. Washington, refrigeration sales manager, will operate from the head offices and showrooms of the sales organisation in England at 363/7, Oxford Street, W.1, and initially activities will be confined to an area of forty miles round London. Distribution will be through specially selected dealers, and, in the first place, preference is to be given to those who already handle the products of Electrical & Musical Industries, Ltd., namely, H.M.V., Columbia, and Marconiphone apparatus.

A hire-purchase scheme is to be handled by the Retailers' Trust, Ltd., which is also an E.M.I. organisation. A customer entering into a hire-purchase agreement will be entitled to free service and maintenance for the whole period of the contract, *i.e.*, twelve, eighteen, or twenty-four months. Full settlement of the retail price of the equipment will be made on acceptance of a transaction. Mr. Christian Barman has been appointed consulting architect, and his advice will be sought on the external appearance of all household appliances to be marketed by the new company, whose first range of domestic refrigerators comprises four models of 4.7, 5.4, 6.7, and 7.8 cu. ft. storage capacity, priced at 40, 50, 60, and 70 guineas.

Boiler Specifications

British-made land boilers have an enviable international reputation. While in other countries statutory regulations and detailed constructional codes are enforced in the interests of public safety, there has so far been no necessity for any such State regulation in Great Britain. But the absence of a recognised British standard has been adverse to the export trade in steam boilers, and the British Standards Institution is accordingly now preparing such standards. The series will take the form of purchasing specifications for particular kinds of boilers, not that of an entire constructional code. The first issued (B.S.S. No. 537) deals with Lancashire and Cornish boilers, excluding auxiliaries, as supplied complete with mountings and fittings for hand firing and natural draught to operate as an independent unit. Sections deal with materials, rules for scantlings, construction, workmanship, and inspection, with provision for alternatives in construction and design, and complete with enquiry and tender appendices. Copies of this new Specification (No. 537-1934) may be obtained from the British Standards Institution, 28, Victoria Street, S.W.1, price 2s. 2d., post free.

Finsbury Old Students

The twenty-second annual dinner of the Finsbury Technical College Old Students' Association took place at the Trocadero on March 17th. Ninety-four members and friends were present, amongst whom were: Mr. and Mrs. Mordey, Dr. and Mrs. Eccles, Professor Catterson Smith, Mr. C. R. Darling, Dr. Armstrong, F.R.S., Mr. and Mrs. R. W. Paul, Mr. E. Kilburn Scott, Mr. and Mrs. Esson, Professor G. T. Morgan, Mr. J. S. Wilson and Mr. C. R. Sams. Messages of regret were read from Professor Miles Walker, Mr. W. J. Tennant, Mr. E. W. Hill, and Mr. E. T. Norris, who were unable to be present through illness. The dinner was followed by an entertainment by Miss Lascelles and Mr. Bruce Hurling.

Coils for Wireless Receivers

It has been claimed that wireless receivers giving better performance in a smaller space can be designed by the use of high-frequency coils of small size made with cores of specially prepared magnetic materials, on account of the facility in screening and the more effective coupling between different coil-windings these coils afford. The published information regarding the performance of the magnetic material used in such coils is critically surveyed in a report issued by the Department of Scientific and Industrial Research (Radio Research Special Report No. 14, "Magnetic Materials at Radio Frequencies: a Critical Survey of present Knowledge") published by H.M. Stationery Office, price 6d.

The Electrical Association for Women

The fourth annual dinner, carnival dance, whist drive, and cabaret of the Hartlepool and District Branch of the Association took place at the Grand Hotel, West Hartlepool, on March 16th. Mr. S. G. Pike (North Eastern E.S. Co.), proposed "The E.A.W.," and Miss C. Haslett responded. Lady Gray, president of the branch, proposed "E.D.A." and Sir William Ray replied to the toast. Coun. Mrs. Wilson proposed "The Guests," on whose behalf Coun. Marcus Bloom, vice-chairman of the West Hartlepool Electricity Committee, responded. The cabaret introduced a novel feature. The performers came from behind a dark curtain screen through the door of a cooker with pans, &c., complete, which was opened by Miss Taylor, the showroom demonstrator. One of the artists represented "Mr. Therm" and looked very dismal in a dingy black costume. She occupied the stage until the oven door opened to introduce "Miss Osram," who sparkled with electrical illuminations and drove "Mr. Therm" away.

The third annual conference of the Yorkshire County Organisation of the E.A.W. (president: Mrs. W. B. Woodhouse) was held at Halifax on Saturday last.

Appointments Vacant

Chief accountant for the States of Guernsey Electricity Department.

Electrical engineer and manager for Sleaford U.D.C.

(See our classified advertisements.)

Makers' Names Wanted

Small portable vacuum cleaner, carried on the shoulders of the operator, and used for removing dust from motors, &c.

MARCO portable electric drill.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Mr. L. H. M. Avery, business director of the Silverton Tramway Co., of Melbourne, has arrived in this country.

[*Jerome, Ltd.*

Mr. R. Illingworth, A.M.I.E.E., A.M.I.Mech.E.

Mr. R. Illingworth, borough electrical engineer and manager of the Poplar electricity undertaking, whose new electricity showrooms are described on page 460 of this issue, went to Poplar in July last as deputy electrical engineer, and was appointed to his present position later in the year. Before going to Poplar he was deputy electrical engineer at Plymouth.

Mr. W. W. Parkinson, the works manager at Blackpool Corporation electricity undertaking, who recently retired after forty years' service, has been presented with an easy chair subscribed for by members of the Electricity Committee. The presentation was made by Ald. G. Whittaker, chairman of the Committee.

Mr. H. C. Babb, M.I.E.E., general manager of the Lothians Electric Power Co., has been elected vice-chairman of the Scottish Centre of the Institution of Electrical Engineers. Mr. Babb is at present president of the Scottish Road Transport Association.

Mr. G. B. Wood is severing his connection with Central Cables & Accessories, Ltd., as its Scottish manager as from March 31st, and is commencing business on his own account as an electrical manufacturers' agent for Scotland at 141, Bath Street, Glasgow. Mr. Wood prior to joining C.C.A., was for twelve years with Messrs. Ward and Goldstone, Ltd.—for four years as Scottish manager.

Mr. L. Pitts, of the staff of Crompton Parkinson, Ltd., of Chelmsford, who was recently married to Miss D. Jolly, was presented by his colleagues with a cheque and a chiming clock.

Captain R. F. Hilton, managing director of the United Steel Companies, has joined the board of the British Power & Light Corporation (1929), Ltd., and the North Wales Power Co., Ltd.

Mr. L. J. Kettle, formerly city electrical engineer of Dublin, has been appointed a full-time member of the Irish Free State Electricity Supply Board. Mr. Kettle has been connected with the Board as consultant since 1929, when the Dublin Corporation undertaking was absorbed by the Board. Mr. L. Forde, of Corbally, County Limerick, has also been appointed a member of the Board.

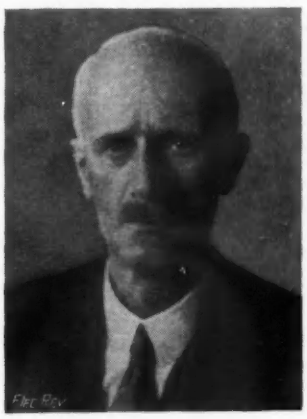
Mr. L. J. Kettle.

Mr. H. Barraclough will join the board of the Concordia Electric Safety Lamp Co., Ltd., on April 2nd, in connection with an increase in the company's capital resources.

Mr. J. Hamilton Mollan, of Leeds, has been appointed representative engineer of Holophane, Ltd., for its North of England territory in place of **Mr. M. C. Toner,** who has been transferred to the company's London office as head of the Publicity Department.

Mr. J. Hacking, who has been a senior member of the staff of Messrs. Merz & McLellan for a number of years, has been appointed chief assistant engineer to the Central Electricity Board and will take up his new duties after Easter. He received his technical education at Leeds University and Armstrong College, Newcastle-on-Tyne, and served his apprenticeship with manufacturers of electric motors in Leeds. In 1908 he joined the Newcastle-on-Tyne Electric Supply Co. in the Operation Department, being transferred to the Construction Department in 1911. He joined Messrs. Merz & McLellan in 1913 and was assistant engineer in Buenos Aires on the electrification of the Central Argentine & Buenos Aires Western Suburban Railways. He was appointed chief assistant engineer in the company's Traction Department in 1923, and from 1926 to 1929 was engaged on general work in connection with the electrification of South African Railways, the Great Indian Peninsula Railway, and the Bombay, Baroda & Central Indian Railway, which necessitated visits to South Africa and Bombay. From 1929 until March last year he was in charge of construction work in the Mid-East and North-East areas of the Central Electricity Board, and during the past year has been in charge of the Electrical Department of the company in Newcastle-on-Tyne.

Mr. E. Thompson, J.P., of Liverpool, has been elected president of the Society of Chemical Industry for the year 1934-35, and he will take office at the annual meeting of the Society, which will be held in Cardiff from July 16th to 20th. Mr. Thompson is an alderman of the Liverpool City Council, and was Lord Mayor in 1930.



Mr. J. F. Simpson

Mr. J. F. Simpson, electrical engineer to Preston Corporation, is retiring on superannuation in August. The Electricity Committee has decided that Mr. D. Adams shall be appointed his successor at a salary of £900, rising to £1,100 by two increments. The Committee is to advertise for a new deputy electrical engineer at a salary of £700, rising by increments of £50 to £800.

Ald. T. E. Higham, of Accrington, has been appointed Sheriff of the County of Lancashire. He is chairman of Mid Lancashire Electricity Advisory Board, and chairman of the District C1 (No. 3) North Western Electricity Industry. He has presided over Accrington Corporation Electricity Committee for many years.

Mr. R. Hammond, A.M.I.C.E., has been appointed assistant secretary to the Institute of Fuel in succession to Mr. F. H. Lightwood who has resigned in order to take up other work.

Mr. L. B. Stillwell, consulting engineer, has been awarded the 1933 Lamme Medal of the American Institute of Electrical Engineers for his work in connection with the design, installation and operation of electrical machinery and equipment. The *Electrical World* states that the presentation will be made at the summer convention of the Institute, which will be held at Hot Springs, Virginia, in June. Mr. Stillwell began his practice as a consulting engineer in New York City in 1900 and has filled engagements with many companies on large and important engineering projects. He is a member of the Institution of Electrical Engineers.

Mr. J. N. Lowe, sales manager of the West Riding telephone district, has retired. He began work with the National Telephone Co. thirty-six years ago.

Mr. R. A. Chattock, M.I.E.E., has recently changed his private address and is now residing at 55, Hamilton Terrace, St. John's Wood, N.W.8.

Obituary

Mr. W. H. Alabaster.—We learn with regret of the death of Mr. W. H. Alabaster, A.M.I.E.E., who retired from the position of city electrical engineer of Melbourne a short time ago owing to illness. Mr. Alabaster, who was a nephew of the late Mr. Henry Alabaster, of London, was born in England and spent the early years of his electrical life here. Among other positions held by him was one on the staff of the Islington borough electricity works. He went out to Melbourne in the year 1903 as assistant electrical engineer, on the selection of the late Sir Malcolm McEacharn. He became chief of the municipal undertaking when Mr. Harper joined the Victoria Electricity Commission. He had occupied that position for fifteen years when he retired. In 1922 he made a prolonged tour of Europe and the United States studying developments in power station practice. Readers will doubtless remember his signed articles contributed to special issues of THE ELECTRICAL REVIEW, in which he reviewed the electricity supply position in Melbourne. His associate membership of the I.E.E. dated from 1902; he was also an associate of the Institute of Engineers (Australia).

Major W. J. Hammer.—A *Reuter* message from New York states that the death has occurred, at the age of seventy-six, of Major William Joseph Hammer, electrical engineer and

inventor, who was one of Edison's right-hand men and represented him in Britain, Germany and France.

Prof. C. G. Pirro.—The death recently occurred in Rome, at the age of sixty-four years, of Signor Professor Cesidi G. Dr. Pirro, who for the past twenty years had been head of the Italian Royal Experimental Institute of Posts and Telecommunications and of the Italian High School of Telegraphs and Telephones.

Major-General G. O. Squier, technical adviser to the American Government on electrical communications, has died at the age of sixty-nine, according to a *Reuter* message from Washington.

Will.—The late **Mr. J. G. B. Stone,** chairman or director of a large number of electricity supply companies, left £123,203 (net personalty £111,435).

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Universal High Voltage Radio, Ltd.—Private company. Registered March 22nd. Capital, £5,500 in 5,000 6 per cent. cumulative preference shares of £1 each and 10,000 ordinary shares of 1s. each. Objects: To carry on business as electricians, radio engineers and electrical engineers, and to acquire the business carried on as Eugen J. Forbat, and to enter into an agreement with E. J. Forbat and M. Leipniker. The first directors are: E. J. Forbat (chairman), Ilona House, Green Hill Road, Farnham, Surrey, and four others. Registered office: 28/29, Southampton Street, Strand, W.C.2.

W. Burns & Co., Ltd.—Private company. Registered March 22nd. Capital, £2,500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electrical and other instruments, appliances, materials, supplies and components connected with wireless telegraphy and telephony, &c. The directors are: W. J. McLeod, 81, Holland Park, W.11, and three others Registered office: 287, City Road, E.C.1.

M. T. Morton, Ltd.—Private company. Registered March 19th. Capital, £300 in £1 shares. Objects: To establish and operate wireless stations and to carry on the business of wireless engineers and manufacturers, &c. The first directors are: N. T. Morton and A. Burniston, both of 9, Park Avenue, Barnoldswick. Registered office: 62, Victoria Road, Earby.

Telephone Trading Co., Ltd.—Private company. Registered March 22nd. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in telegraphic, telephonic and television apparatus and equipment, &c. The first directors are: S. D. Cramer and F. Igerscheimer. Solicitors: Stoneham & Sons, 108a, Cannon Street, E.C.4.

Braintree Broadcast Relay Service, Ltd.—Private company. Registered March 16th. Capital, £3,750 in 3,000 8 per cent. cumulative participating preference shares of £1 and 3,000 ordinary shares of 5s. each. Objects: To acquire the business established by the Broadcast Relay Service (Clacton), Ltd., at Braintree, and to construct and maintain wireless signal stations, &c. The first directors are: J. F. Powell, 34, Wellesley Road, Clacton-on-Sea; and H. Cochrane. Registered office: 93, Hayes Road, Clacton-on-Sea.

I. & W. Rockall, Ltd.—Private company. Registered March 19th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers and repairers of and dealers in electrical accumulators, batteries, acids, containers, &c. The directors are: W. E. Fletcher, Shelbourne Hotel, Upper Bedford Place, W.C.; and Mrs. Ivy W. Rockall, 133, High Street, Teddington. Registered office: 7/8, Ham Yard, Great Windmill Street, Piccadilly Circus, W.1.

A. E. Rising, Ltd.—Private company. Registered March 21st. Capital, £500 in £1 shares. Objects: To carry on the business of electrical engineers and contractors, wireless engineers, &c. The first directors are: A. E. Rising, electrical engineer, and Mrs. Julia M. Rising, both of 3, Hill Crest, Potters Bar, Middlesex. Registered office: 76, The Quadrant, High Street, Southgate, N.14.

Newbury Electrical Co., Ltd.—Private company. Registered March 21st. Capital, £1,500 in £1 shares. Objects: To carry on the business of manufacturing electrical engineers, automobile engineers, electro-platers, battery, accumulator and cell manufacturers, &c. The subscribers are: Anna Globe, secretary, and R. C. Globe (managing director), both of 99, Kenilworth Avenue, Reading.

Noset Radio (Relays), Ltd.—Private company. Registered March 21st. Capital, £1,000 in £1 shares. Objects: To establish and manage relay stations, &c. The first directors are: H. Boocock, 66, Glen Street, Colne; P. Brown, 8, Causey Foot, Nelson; N. Plunkett, 4, Hill Place, Nelson; and F. Simpson, 33, Vernon Street, Nelson. Registered office: 48, Higher Esnam, Blackburn.

Returns of Electrical Companies

South East Kent Electric Power Co., Ltd.—The nominal capital has been increased by the addition of £50,000 in £1 ordinary shares beyond the registered capital of £100,000.

Metropolitan Electric Cable and Construction Co., Ltd.—The nominal capital has been increased by the addition of £75,000 beyond the registered capital of £75,000. The additional capital is divided into 75,000 5½ per cent. redeemable cumulative preference shares of £1 each. The existing unissued 30,000 shares of 10s. have been consolidated into 15,000 shares of 10s.

A. E. White & Co., Ltd.—Debenture, dated March 6th, 1934, to secure £275, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: John C. Peters, 4, New Street, York.

Butler's Radio, Ltd.—Two debentures, both dated March 7th, 1934 (and ranking *pari passu*), to secure £100 and £50, respectively, charged on the company's undertaking and property, present and future, including uncalled capital. Holders: A. Le Boutillier, 219, Forest Road, Walthamstow, E.17, and P. H. Turner, 9, Chelmsford Road, Woodford, Essex.

Permalite Signs, Ltd.—Further charge on 23 and 25, Water Lane, Leeds, dated March 5th, 1934, to secure £300. Holder: B. T. Mason, "Aberbour," Alwoodley Lane, Leeds.

Wireless Relay Services, Ltd.—Satisfaction in full on December 14th, 1933, by transfer to the Sowerby Bridge Relay Service, Ltd., of the property comprised in mortgage dated December 30th, 1930, and registered January 10th, 1931.

H. Duree, Ltd.—Particulars filed of £1,000 debentures authorised January 7th, 1934, charged on the company's undertaking and property, including uncalled capital, the amount of the present issue being £700.

Tubelamps, Ltd.—The nominal capital has been increased by the addition of £5,000 in £1 ordinary shares beyond the registered capital of £10,000.

Kirby (Wimbledon), Ltd.—W. T. Flower, 19, St. George's Road, S.W.19, ceased to act as receiver and manager on January 7th, 1934.

Sowerby Bridge Relay Services, Ltd.—Mortgage for £246 2s. 4d. dated December 30th, 1930 charged on 2, Myrtle Terrace, Sowerby Bridge, Yorks (being property acquired by the company on December 14th, 1933). Registered March 14th, 1934, pursuant to Section 81 of the Companies Act, 1929. Mortgagees, Halifax Building Society.

Rural Electricity Supply Co., Ltd.—Capital, £10,000 in 9,500 preference shares of £1 and 10,000 deferred shares of 1s. Return dated October 7th, 1933. 5,512 preference and 5,713 deferred shares taken up. £3,156 13s. paid on 2,871 preference and 5,713 deferred shares. £2,641 considered as paid on 2,641 preference shares. Mortgages and charges, nil.

Car & Electrical Services, Ltd.—Capital, £1,000 in £1 shares. Return dated November 4th, 1933. 610 shares taken up. £610 paid. Mortgages and charges, nil.

Peerless Electrical Manufacturing Co., Ltd.—Capital, £50,000 in 46,500 shares of £1 and 70,000 shares of 1s. Return dated November 2nd, 1933. 37,500 £1 and 48,368 1s. shares taken up. £37,896 10s. paid on 36,000 £1 and 45,368 1s. shares, leaving £371 18s. calls unpaid. £1,650 considered as paid on 1,500 £1 and 3,000 1s. shares. Mortgage and charges, £14,500.

Neron Lamps, Ltd.—Capital, £5,000 in £1 shares. Return dated November 17th, 1933. All shares taken up. £5,000 paid. Mortgages and charges, nil.

R. Roberts (Birmingham), Ltd.—Capital, £500 in £1 shares. Return dated November 6th, 1933. All shares taken up. £500 paid. Mortgages and charges, £300.

City Notes

The Lancashire Electric Light & Power Co., Ltd., held its annual meeting on March 22nd, Mr. A. Shepherd (chairman) presiding. In presenting the report and accounts (Electrical Review, March 23rd, p. 434) the chairman said that the total kWh delivered to feeders during the year under review was 315,023,126, as compared with 277,731,938 kWh in 1932. The total sales were 284,860,979 kWh, an increase of 14 per cent., which compared with an increase of 9.1 per cent. in 1932. With regard to this increase, the spinning and weaving section of the textile trade—Lancashire's staple industry—increased its consumption by 17.5 per cent., partly due to new connections and partly to increased consumption by old consumers. Another large increase was in respect of l.p. supplies given under the Provisional Orders held by the company, the increase in this case being 23.2 per cent. over the consumption for 1932. Generally, all classes of consumer supplied by the company had increased their consumption. At last year's meeting it was mentioned that they had entered into a contract for the supply of electricity to the Manchester and Bury Electric Railway, and supply was now being given under this contract. There had been an increase in the number of consumers who had taken advantage of the company's assisted-wiring scheme, and the demand for cookers, water-heaters, radiators and wash-boilers, and other domestic apparatus, had shown considerable expansion. The number of l.p. consumers connected during the year was a record, and represented an increase of 18.9 per cent. The Ormskirk showroom was opened towards the end of the year, and it had been decided to extend the Chorley showroom and offices. By means of local exhibitions and the use of a travelling showroom it was intended to intensify the company's work in popularising the use of electricity in all parts of their area for the many domestic and other purposes for which it was available. Although Lancashire was not usually considered as a rural area they were giving supplies in many districts where the population was sparse, and had connected up 460 farms to the mains.

The Scottish Power Co., Ltd.—Presiding at the annual meeting held on March 23rd, Mr. G. Balfour (chairman) said that the company owned fourteen subsidiary companies, the most important being the Scottish Central Electric Power Co., the Fife Electric Power Co., and the Grampian Electric Supply Co. These three companies supplied in an area of 5,116 sq. miles. The Grampian Co., in addition, owned and operated the Scottish Highlands Order covering a further area of 5,500 sq. miles. Altogether they had powers to supply in an area of 11,977 sq. miles. The Rannoch power station owned by the Grampian Co. had been in continuous operation since November 30th, 1930, and had given excellent service, while the Tummel hydro-electric station had been in operation since the beginning of the year. Last year they purchased the Perth Corporation's power station and now supplied that city in bulk. Their subsidiary power and lighting companies sold 148 million kWh last year, an increase of 8,400,000 kWh, as compared with the previous year, while the new consumers connected totalled 6,105, bringing the total to 37,052. The operating companies connected 18,000 kW during the year, making the total connected load 133,600 kW. They provided an additional 165 miles of h.p. lines and seventy miles of l.p. distributors, and they now owned through their subsidiaries 1,072 miles of h.p. lines and 641 miles of l.p. lines. A supply of electricity was made available during the year in seven burghs and twenty-six villages, and their subsidiaries now afforded supplies in seventy burghs and 137 villages. Fifteen agreements had been entered into with various authorities for street lighting. The maximum supply demanded amounted to 51,200 kW, an increase of 8,400 kW. Included in the total kW was the bulk supply to the Central Board. From January 1st of this year they supplied an additional load of 12,000 kW to that authority at 50 per cent. load factor.

The International Automatic Telephone Co., Ltd., held its annual meeting on March 23rd, when Sir Alexander Roger (chairman), who presided, said that the past year's results, while disappointing were not unduly disquieting. They had succeeded in getting their fair share of the available business, but during the earlier months of 1933, a number of important contracts under negotiation were held up, while there was for a time a general slowing-up of demand which adversely affected their general trading results and those of their subsidiary, the Automatic Electric Co., Ltd. A "no-delay" trunk exchange had just been completed at Manchester by the Automatic Co. and other equipments were on order. During 1933 orders were received from forty-two overseas countries, including the contract for three automatic exchanges for the Lithuanian Government. Substantial orders had also been received from the South African Government for the supply of Strowger line-finder exchanges for Durban and Johannesburg. An order had also been received for the installation of further automatic equipment in Lisbon. Numerous orders were secured for "Electromatic" vehicle-actuated traffic signals. Efforts were being made to expand the markets for subsidiary products such as domestic electrical appliances, public fire-alarm equipment, and private automatic exchanges. So far as they and their subsidiary were concerned, their order books enabled them to look forward to greater activity in 1934.

British Insulated Cables, Ltd.—Presiding at the annual meeting, held on March 27th, Sir Alexander Roger (chairman) said that the trading profit was disappointing and arose mainly from a decline in orders affecting particularly some of the large and older departments, but there were indications of some improvement. About £130,000 had been spent on modernising plant and buildings, and on additional manufacturing facilities. In certain products the demand was beyond their capacity to supply, necessitating running some of the plant day and night. In the last six years over £800,000 had been spent on plant and machinery. Their new enterprise, British Copper Refiners, had sustained the success indicated last year. Not only had they disposed of their contract quantity of copper, but they had exercised their option upon additional tonnage. Last year was the worst, both in the matter of turnover and of profit rate, that they had had for a long time. Competition was continually on the increase, and it was astonishing how new firms would start in the heavy cable-making industry, in spite of the fact that there was insufficient work for half the plant already in the country. The cable-making business was trending away from the heavier towards the lighter types of material, due to the transmission of power at higher and higher potentials, and to the spread of business in telephones and wireless apparatus. They had had to adapt themselves to the diminution of the average value of the orders they received as compared with a few years ago. Its cause was traceable to the reluctance of buyers to purchase beyond their immediate requirements, particularly when they could rely upon prompt delivery from stock. They had reorganised their departments to deal with prompt deliveries, and had to a large extent mechanised their clerical work. They had no fewer than 134 different items of manufacture. They manufactured every possible requirement of bare or insulated conductors, and had as many as six different systems for the wiring of factories, offices, collieries and private houses. The annual report of the Central Electricity Board showed an increased consumption of electricity during 1933 of 10.7 per cent. over the previous year. The most recent statistics showed that this rate of improvement was rapidly increasing, and they were hoping that shortly there would be a greater demand for the heavier type of power cables, arising out of the need to supplement the existing networks because of the heavier load taken for power purposes by factories throughout the country, and for heating and cooking by domestic consumers. Regarding the future, since the middle of last year a steady improvement in their business had set in, and at the moment they had in hand a larger volume of orders than they had at this time a year ago. The chairman concluded by paying a tribute to the staff and to Mr. G. H. Nisbett, the managing director.

The Bournemouth & Poole Electricity Supply Co., Ltd., held its annual meeting on March 27th. Sir Bernard E. Greenwell, Bt. (chairman), who presided, said that the accounts reflected not only the effect of reduced prices, but the continued expansion of the company's business. The sales for the year totalled 29,123,385 kWh, an increase of 3,429,839 kWh over the previous year. They had added 24½ miles of h.p. lines, 23¼ miles of l.p. mains, and 46 miles of service lines to their distribution system, and the total length of mains now exceeded 860 miles. In addition to the new areas which they had taken over in recent years they had established thirty points of distribution for radiating supplies to villages in the rural areas. They had occupied a section of their new offices and showrooms and the remaining portion would shortly be completed. Nearly 1,500 new applications were received for supply under their assisted-wiring scheme. In addition to the reduced rates under the 1932 Act, from the September quarter of 1933 they reduced the charges in the Wimborne extension order, and had also made reductions in those areas which had been added to the boroughs of Bournemouth and Poole. Satisfactory progress had been made in the new areas acquired, and their associated company, the Blandford Company, continued to advance. For the first two months of the current year the sales of electricity had increased by over 11 per cent., as compared with the corresponding period of 1933, while additional consumers represented 1,267 kW of new business.

The Anglo-Portuguese Telephone Co., Ltd., held its annual meeting on March 26th, when Sir Alexander Roger (chairman), who presided, said that they decided to follow up the conversion of the Trindade exchange to automatic working by converting the North Exchange from manual to automatic. The work commenced some months ago and the cutover was planned for October of this year. The equipment to be installed would have a capacity for 8,800 lines, but the building itself had been enlarged so that it was capable of providing for approximately twice that number. During 1933, 2,620 further stations were added, representing an increase of approximately 8 per cent. and raising the total number of stations to 35,706. Their toll traffic increased by 23 per cent., due to a large extent to the introduction of the "on demand" service.

The Brompton & Kensington Electricity Supply Co., Ltd., reports a balance from net revenue account of £38,769, to which is added £4,114 brought in, making £42,883. The ordinary dividend for the year is unchanged at 7 per cent., and £10,215 is carried forward. The connections increased from 38,646 kW in 1932 to 41,739 kW in 1933, and sales of electricity from 15,708,508 kWh to 17,072,292 kWh. The report records the death of Col. W. F. Leese, a director, and the election of Mr. J. S. Highfield to the board to fill the vacancy. Meeting: April 5th.

The Chelsea Electricity Supply Co., Ltd., reports a profit for 1933 of £63,392, as compared with £55,929 in the preceding year, to which is added £5,812 brought in and interest on investments, making £70,453. After deducting debenture interest, &c., it is proposed to maintain the ordinary dividend for the year at 7 per cent., and to carry forward £8,274. The sales of electricity totalled 15,438,224 kWh, an increase of 1,545,103 kWh as compared with 1932. Meeting: April 5th.

Bruce Peebles & Co., Ltd., report a trading loss for 1933 of £10,952, and after deducting £436 brought in and transferring £11,000 from general reserve, there is a balance at credit of profit and loss account of £484. No preference or ordinary dividend is recommended. The report states that during the year progress has been made in the development of new lines of electrical plant. A new series of industrial electric motors and glass-bulb rectifiers are now complete and on the market. The orders in hand at the close of the year were much in excess of recent years. Included in these is a contract for the Southern Railway for the whole of the rectifier sub-stations for the Eastbourne and Sevenoaks extensions of the railway company's electrified system. This is said to be the largest contract of this nature ever placed in the United Kingdom, having a total capacity of 57,500 kW.

Pinchin, Johnson & Co., Ltd.—Presiding at the annual meeting held on March 26th, Mr. E. Robson (chairman), in the course of his speech, said that there had been a gratifying expansion in turnover of all their units and net profit results had been proportionately maintained. At home there had been a definite improvement in the consumption of paint and lacquer products by the principal industries in which they had participated. In their principal overseas markets the results had been very gratifying, and there had been a decided advance in the demand for their products. The sales throughout the organisation from January 1st to date showed a satisfactory advance over the corresponding period of 1933.

Associated Electrical Industries, Ltd., has recommended a dividend at the rate of 3 per cent. on the ordinary shares for 1933, and is carrying forward £102,615. A dividend of 4 per cent. was paid for 1932, the carry-forward being £102,414.

The Marconi International Marine Communication Co., Ltd., has announced a final dividend of 5 per cent. (less tax), making 7½ per cent. for 1933.

A. Reyrolle & Co., Ltd., are maintaining the ordinary dividend for 1933 at 12½ per cent.

Stocks and Shares

Monday Evening.

THE policy of the Government continues to be directed towards the continuance of cheap money. Gilt-edged stocks have recovered from the slight tremor that shook their prices upon the success of the Socialist party at the recent L.C.C. elections. That the return of the Socialists to municipal power in London hints plainly at the prospect of heavy borrowing is generally agreed. The likelihood of substantial new loans has no terror, nowadays, for the investor who, as so frequently declared, wants fresh outlets into which to place his capital. Therefore, British Government, corporation and municipal securities are firm. Central Electricity stocks have hardened, the 4½ per cents. of 1951-1973 being up 1½ to 109¼. The revenue returns are sufficiently satisfactory to keep alive the hope of a reduction of 6d. in the income tax. The Budget date, as most people know, is April 17th

Passing reference was made here last week to a renewal of demand for preference shares of the London electricity supply companies. In some cases, the quotations now ruling in the market will allow less than 4 per cent. yield upon the money at to-day's levels. As one example, there may be mentioned Charing Cross Electric Supply (City Undertaking) 4½ per cent. preference, of which 500 are on offer at 23s. 9d., the yield being hardly more than 3¾ per cent. London Electric preference shares of £5 each can be bought in a small way at 7½ ex this month's dividend. The yield is four guineas per cent. on the money. The dividend in this instance is non-cumulative, but last year's profits of £179,800 sufficed to cover the dividend service on the preference shares more than four times over. City "Lights" 6 per cent. first preference stand at 31s. 6d., and the City Company's 8 per cent. second preference at 36s. 3d.

Provincial Electrical Issues

Lancashire Light and Power ordinary shares are better than the official price indicates, there being buyers at 39s. 3d. or thereabouts. At the meeting last week the chairman touched upon the interesting fact that practically every class of consumer had shown an increased consumption. The Scottish Power Company also held its annual meeting a few days ago, and the chairman mentioned that the fourteen subsidiary companies, with the parent, are responsible for the supply of electricity in an area of 12,000 sq. miles. Electrical Distribution of Yorkshire shares are better at 48s. 9d. Midland Counties, on the other hand, have gone back to 38s. 9d. West Gloucestershire ordinary at 75 shows a point improvement. The 6½ per cent. preference, which at the beginning of this month stood about 103, is now 113. British Light & Power have risen to 21s. 9d., and Atlas to 8s. 9d. A feature amongst the Colonial shares is a jump to 5⅛ in Victoria Falls ordinary, this being a further improvement upon the rise secured during the past fortnight. The preference stand at 42s.

North-Eastern Possibilities

Edmundson's 6 per cent. preference can be obtained, as to 1,500 shares, at 29s., yielding £4 2s. 9d. per cent. with liberal margin for the dividend, this being due in the middle of January and July. North Eastern Electric Supply 5 per cent. non-cumulative preference are interesting because of the participation rights the shares carry. After the ordinary shares have received 8 per cent., the preference are entitled to a further 3 per cent., both classes ranking equally thereafter. The ordinary dividend has been 6 per cent. per annum for the last seven years. Five hundred preference shares are available at 26s. 6d. cum 6d. dividend, and return at this price £3 15s. 6d. per cent. on the money. Some time may elapse before the participating rights possess tangible value, but, having regard to the growth of electric consumption, the consideration deserves to be kept in mind by the investor.

Cables and Wireless

The improvement shown in Cables and Wireless index figure for February was too modest for it to induce fresh support for the stocks. The preference has gone back to 72½, and both the ordinary issues have drooped. Great Northern Telegraphs at 38 show a further advance. Marconi Marines have attracted attention, and the price moved up to 30s. upon a little buying. On the other hand, Canadian Marconis suffered a sharp reaction, going back to 10s. 3d. upon selling said to originate from "the other side" When the pressure was relieved the price rallied to 12s. Baird Televisions failed to retain all their gain of last week.

Dollar Stocks

American Telephone and Telegraph fell 2 to 115½. Internationals are 14½. Montreal Light & Power gave way upon circulation of alarmist reports concerning the financial security of the municipality, the price of the shares hardening again to 38½ upon responsible doubts being cast upon the accuracy of the reports. The regular quarterly dividend of 38 cents has been declared. Other Canadian utilities are steady. Brazilian Tractions have given way to 11½.

Manufacturing and Equipment Shares

Associated Electrical Industries ordinary shares are flat, in consequence of the dividend for the year being no more than 3 per cent., comparing with 4 per cent. for 1932. The carry-forward of £102,414 is practically the same as that of the previous twelvemonth. Some people were obviously disappointed at the reduction in the dividend rate, though from the manner in which the price has been falling during the past few weeks it was clear that anticipation of a reduction in dividend was at work. The reason for the lowered profit the accounts must be awaited to explain. Other manufacturing and equipment descriptions are dull. General Electrics fell back 1s. 9d. to 42s. Henleys and Callenders are ½ lower at £6 and 58s. 9d. respectively. Brush ordinary at 38 shows a fall of 2. Business has been done in the stock at 35½. British Aluminium ordinary are 6d. lower at 29s. The market as a whole is inclined to be heavy. Reyrolle shares, exceptionally, are better at 52s.

The iron and steel list keeps fairly steady. Babcocks strengthened to 45s. There is very little doing in rubber shares.

Share List of Electrical Companies

HOME ELECTRICITY COMPANIES.

	Nom.	Dividend. 1932.	Dividend. 1933.	Price. Mar. 27.	Rise or Fall.	Yield. p.c. £ s. d.
Bournemouth and Poole	1	15	15	78/9	—	3 16 2
Brompton Ordinary	1	7	7	34/6	—	4 1 2
Charing Cross Ordinary	1	7	7	35/6	—	3 19 0
Chelsea	1	7	7	35/-	—	4 0 0
City of London	1	7⅛	7⅛	37/-	—	4 1 1
Clyde Valley	1	7	7	42/-	—	3 6 8
County of London	1	10½	10½	59/6	—	3 11 0
Edmundson's 7% Pref.	1	7	7	34/-	—	4 2 4
Elec. Dis. Yorkshire	1	9	9	48/9	+6d.	3 13 9
Elec. Supply Corporation	1	11	11	76/3	—	2 17 8
Kensington Ordinary	1	7	7	35/-	—	4 0 0
Lancs Light and Power	1	7	7½	38/9	—	3 17 4
London Electric	1	7	7	35/6	—	3 19 0
Metropolitan	1	10	10	53/9	—	3 14 3
Midland Counties	1	7	7	38/9	−⅛	3 12 0
Mid. Elec. Power	1	8	8	43/9	—	3 13 0
North Eastern Electric Ordinary	1	6	6	35/6	—	3 7 8
Do. 7% Pref.	1	7	7	34/6	—	4 1 2
Northampton	1	10	10	56/3	—	3 11 3
Notting Hill 6% Pref.	10	6	6	13¾	—	4 8 11
North Met. Elec. Ordinary	1	10	10	63/9	+6d.	3 2 10
Do. do. 6% Pref.	1	6	6	31/6	+1/-	3 16 2
St. James' and Pall Mall	1	7	7½	36/6	+6d.	4 3 4
Scottish Power	1	8	—	2½	—	3 15 6
South London	1	7	7	35/6	—	3 19 0
Westminster Ordinary	1	7	7	35/-	—	4 0 0
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	22/-	—	6 16 4
Yorkshire Elec.	1	8	8	49/6	—	3 4 9

PUBLIC BOARDS.

		1931.	1932.			
Central Electricity, 1950–70	Stock	5	5	113	—	4 8 6
Do. 1955–75	„	5	5	115	+1	4 7 0
Do. 1951–73	„	4½	4½	109½	+1⅛	4 2 2
Do. 1963–93	„	—	3½	96	—	3 13 0
London & Home Counties, 1955–75	„	4½	4½	109	—	4 2 7
London Passenger Transport, A	„	—	4½	118½	—	3 16 0
Do. do. B	„	—	5	120½	—	4 3 0
Do. do. C	„	—	—	77½	—	—
West Midlands Joint Elec. 1948–68	„	—	5	113	—	4 8 6

TELEGRAPH AND TELEPHONES.

American Tel. & Tel.	$100	9	9	115½	−2	7 15 10
Anglo-Am. Tel. Pref.	Stock	6	6	113	—	5 6 2
Do. Def.	„	1½	1½	28	—	5 7 2
Cables & Wireless 5½% Pref.	„	2¾	2¾	72½	−1	3 15 10
Do. A. 7½% Ord.	„	Nil	Nil	23	−½	—
Do. B. Ord.	„	Nil	Nil	10	−½	—
Globe Tel. and T. Ord.	10	Nil	2½	9½	—	2 11 3
Do. do. Pref.	10	6	6	12¾	—	4 13 4
Great Northern Tel.	10	20	20	38	+½	5 5 3
Marconi-Marine	1	10	7½	30/-	+⅛	5 4 2
Oriental Telephone Ord.	1	12	12	3½	—	*3 16 10

HOME AND FOREIGN TRAMS, ETC.

Anglo-Arg. Trams First Pref.	5	Nil	Nil	2/-	—	—
Do. do. 2nd Pref.	5	Nil	Nil	1/6	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	6	—	—
British Electric Traction Df. Ord.	„	5	5	570	−10	—
Do. do. Pref. Ord.	„	8	8	157½	—	5 1 7
Brazil Traction	100	—	—	11¼	−⅜	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	102½	—	4 17 6
Mexico Trams, 5% Bonds	—	5	5	19½	—	25 12 8
Mexican Light Common	100	Nil	Nil	8	—	—
Do. 7% Pref.	100	7	7	11	—	—
Do. 1st Bonds	—	5	5	50½	—	9 18 0
Victoria Falls Ord.	1	15	20	5⅛	+⅜	3 7 4
Yorkshire (West Riding)	1	2½	5	18/9	—	5 6 8

MANUFACTURING COMPANIES.

Assoc. Elec. Ord.	1	4	—	16/-	−1/9	3 15 0
Do. Pref.	1	8	8	31/3	—	5 2 5
Babcock & Wilcox	1	14	9	45/-	+6d.	—
British Aluminium Ord.	1	5	5	29/0	−6d.	3 9 0
British Insulated Ord.	1	15	15	72/6	—	4 2 8
Brush Ord.	Stock	Nil	Nil	38	−2	—
Callender's	1	15	15	58/9	−½	5 1 4
Do. 6½% Pref.	1	6½	6½	30/9	—	4 4 6
Crompton Parkinson Ord.	5/-	22½	12½	25/-	—	—
Do. 8% Pref.	1	8	8	31/3	—	5 2 5
Edison-Swan 1st Pref.	1	7½	7½	24/6	—	6 2 5
Do. 5% Deb.	Stock	5	5	102½	—	4 17 7
Electric Construction	1	Nil	Nil	10/-	—	—
Enfield Cable Ord.	1	25	25	85/-	—	4 14 1
English Electric	1	Nil	Nil	6/3	—	—
Do. do. Pref.	1	Nil	Nil	8/9	—	—
Ever Ready	5/-	35	35	29/6	—	5 18 8
Ferranti Pref.	1	7	7	26/-	—	5 7 9
G.E.C. Pref.	1	6½	6½	30/-	—	4 6 8
Do. Ord.	1	8	8	42/-	−1/9	3 16 1
Henley's	1	30	30	6	−¼	4 17 10
Do. 4½% Pref.	5	4½	4½	5½	—	4 5 9
India-Rubber Preferred	1	—	—	15/-	—	—
Johnson & Phillips	1	5	5	19/6	−1/9	5 2 7
Siemens Ord.	1	7½	6½	19/6	—	—
Telegraph Construction	£1	Nil	Nil	25/-	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parenthesis are those under which the specifications will be printed and abridged, and all subsequent proceedings taken.

1932

15270. "Backfire-preventing means for rectifiers." Westinghouse Electric & Manufacturing Co. July 4th, 1931. (406651.)

17885. "Automatic paralleling of alternating-current systems." Westinghouse Electric & Manufacturing Co. June 30th, 1931. (406643.)

18175. "Electric discharge tubes." J. H. O. Harries. June 27th, 1932. (406677.)

19397. "Circuits including thermionic valves for the amplification of electric signals." E. Y. Robinson and Associated Electrical Industries, Ltd. July 8th, 1932. (406744.)

21346. "Electric control systems for electric elevators." British Thomson-Houston Co., Ltd. July 28th, 1931. (406655.)

21850. "Electric wire conduits." Broughton Copper Co., Ltd., and F. Tomlinson. August 4th, 1932. (406724.)

23679. "Electric switches with free-handle automatic release." W. W. Triggs (Felten & Guilleaume Carlswerk Akt.-Ges). August 24th, 1932. (406694.)

23814. "Method of and apparatus for electrically operating or controlling road traffic signals." W. H. Scott and R. G. Woods. August 25th, 1932. (406678.)

24003. "Electrical signalling devices and methods of operation thereof." British Thomson-Houston Co., Ltd., and F. Widnall. August 27th, 1932. (406649.)

24087. "Thermionic valves." J. H. Edwards. August 29th, 1932. (406659.)

24422. "Manufacture of photo-electric cells." R. H. Cubitt, A. L. Williams and Westinghouse Brake & Saxby Signal Co., Ltd. August 30th, 1932. (406665.)

24286. "Electro-optical image producing systems such as television systems." Electrical Research Products, Inc. September 16th, 1931. (406672.)

24323. "Modulated carrier-wave transmitting systems." Marconi's Wireless Telegraph Co., Ltd. September 19th, 1931. (406674.)

24324. "Echo-sounding apparatus." Marconi Sounding Device Co., Ltd., and J. A. Slee. August 31st, 1932. (406699.)

24499. "High-tension electric cables." Standard Telephones & Cables, Ltd., and J. K. Webb. September 2nd, 1932. (406704.)

24500. "Co-axial electric conductor systems." Standard Telephones & Cables, Ltd. December 31st, 1931. (406705.)

24501. "Train describing or platform indicator systems." Standard Telephones & Cables, Ltd., J. B. Griffiths, A. Brown and R. H. Dunn. September 2nd, 1932. (406706.)

24526. "Modulated carrier-wave transmitters." Marconi's Wireless Telegraph Co., Ltd., and W. A. E. Quilter. September 2nd, 1932. (406708.)

24527. "Scanning apparatus for use in television picture telegraph and like systems." Marconi's Wireless Telegraph Co., Ltd., H. M. Dowsett and L. E. Q. Walker. September 2nd, 1932. (406709.)

24747. "Electromagnetic vibration-translating devices." Electrical Research Products, Inc. September 9th, 1931. (406739.)

25085. "Telephone transmitters or receivers for transmitting, reproducing or recording sound waves." A. H. Midgley. September 8th, 1932. (406749.)

25209. "Flameproof electric switches and switchgear." H. Fawcett, G. S. Watkins and Associated Electrical Industries, Ltd. September 9th, 1932. (406754.)

25387. "Dynamo-electric machines for converting alternating current to direct current or vice versa." G. M. Pestarini. September 12th, 1931. (406759.)

25596. "Control of electric motors for lifts or elevators." W. Wood and W. Wadsworth & Sons, Ltd. September 14th, 1932. (406760.)

26238. "Process and apparatus for effecting the electrodeposition of metals." G. E. Adey. September 21st, 1932. (406767.)

26819. "Electric withdrawable switchgear." General Electric Co., Ltd., and F. J. Keeley. September 27th, 1932. (406775.)

26941. "Means for connecting wires and cables." British Insulated Cables, Ltd., and J. W. Astley. September 28th, 1932. (Cognate application, 20952/33.) (406776.)

26966. "Electric motors." British Thomson-Houston Co., Ltd. September 29th, 1931. (406777.)

27409. "Telephone systems." Siemens Bros. & Co., Ltd., and D. A. Christian. October 3rd, 1932. (406779.)

28448. "Readily changeable indicator or announcement apparatus." British Electrical Federation, Ltd., and A. Twidle. October 12th, 1932. (406790.)

29661. "High-voltage bushings." A. J. Maslin. December 4th, 1931. (406796.)

30736. "Spools or reels used for holding cable such as electric cable or flex." F. W. Chambers. November 1st, 1932. (406804.)

31111. "Electric circuit-breakers." Ferguson, Pailin, Ltd., and G. Pailin. November 4th, 1932. (406807.)

31858. "Machine for producing bobbins for electric dry cells." H. J. C. Forrester (Nova Machine, Inc.) November 10th, 1932. (406816.)

33119. "Calculating devices for thermionic valve circuits." General Electric Co., Ltd., and D. C. Espley. November 23rd, 1932. (406828.)

33183. "Regulation of the voltage of a power supply system or other a.c. circuit." Ferranti, Ltd., and E. D. T. Norris. November 23rd, 1932. (Addition to 341903.) (406830.)

33264. "Tumbler switches." A. P. Lundberg & Sons, Ltd., and G. Pegg. November 24th, 1932. (406831.)

33754. "Electric switches or circuit-breakers." G. Ellison, Ltd., and J. Anderson. November 29th, 1932. (406834.)

33998. "Electrical speed and distance indicators for use on mechanically propelled vehicles." A. G. Smith and E. A. Watson. December 1st, 1932. (406835.)

34148. "Driving arrangements for stepping switches." Siemens Bros. & Co., Ltd., and A. A. Southam. December 2nd, 1932. (406836.)

34554. "Electric selector switches." Siemens Bros. & Co., Ltd., and E. A. Forceville. December 6th, 1932. (406840.)

34751. "Method of capping sealed envelopes such as electric discharge tubes or the like." M.-O. Valve Co., Ltd., and C. J. Smithells. December 8th, 1932. (406841.)

35756. "Resistances combined with electric switches." International General Electric Co., Inc. December 16th, 1931. (406844.)

35765. "Television apparatus." Marconi's Wireless Telegraph Co., Ltd. January 16th, 1932. (406845.)

1933

546. "Electric motors." International General Electric Co., Inc. January 6th, 1932. (406852.)

1249. "Electric terminals." C. A. Turner. January 13th, 1933. (406853.)

1627. "Electromagnetic switches of the type used in telephone systems." General Electric Co., Ltd., C. C. Puckette and W. R. Rose. January 18th, 1933. (406854.)

2032. "Electric motors." International General Electric Co., Inc. January 22nd, 1932. (406857.)

3484. "Electrically actuated jacks for motor vehicles." W. Muller. February 4th, 1933. (406861.)

5570. "Conversion of mechanical oscillations into sound waves by electromagnetic means." K. Von Dreger and F. Beier. February 23rd, 1932. (Cognate application 5571/33.) (406865.)

9059. "Driving systems for Ferraris meters." Landis & Gyr Akt.-Ges. April 7th, 1932. (406871.)

11581. "Electric discharge tubes." C. H. F. Muller Akt.-Ges. May 13th, 1932. (406880.)

16037. "Frequency changing circuits and superheterodyne receivers incorporating the same." Marconi's Wireless Telegraph Co., Ltd. June 2nd, 1932. (406895.)

17785. "Methods and apparatus for measuring distances." Submarine Signal Co. (London), Ltd. (Submarine Signal Co.) June 22nd, 1933. (406903.)

18319. "Electron-emitting cathodes suitable for use in electron-discharge devices." Telefunken Ges. für Drahtlose Telegraphie. June 27th, 1932. (406905.)

18807. "Electric heating devices." Westinghouse Electric & Manufacturing Co. July 1st, 1932. (406907.)

19514. "Electric variable resistances." C. S. Garland. July 10th, 1933. (406912.)

19536. "Grid-controlled rectifiers." Akt.-Ges. Brown, Boveri et Cie. July 8th, 1932. (Addition to 397745.) (406913.)

20276. "Apparatus for electrocuting animals." A. D. Clarke, H. F. Roberts and G. H. Vaughan. July 18th, 1933. (406916.)

21301. "Device for the production of galvanic coatings." Soc. d'Electro-Chime d'Electro-Métallurgie et des Aciéries Electriques d'Ugine. July 29th, 1932. (406923.)

24520. "Actuating or controlling devices for electrical apparatus." K. J. Jungholm. September 4th. 1933. (406934.)

25130. "Low-temperature electric heat radiating panels." Unity Heating, Ltd., and D. G. Petrie. September 11th, 1933. (406936.)

28850. "Cores for dynamo-electric machines and methods of making the same." British Thomson-Houston Co., Ltd. October 26th, 1932. (406951.)

31514. "Electrolytic condensers." Elektrizitäts Akt.-Ges. Hydrawerk. January 11th, 1933. (406959.)

32539. "Electromagnetically - operated warning horns." Klaxon, Ltd., and E. T. Cook. November 21st, 1933. (406960.)

33190. "Automatic reclosing circuit-breaker systems." British Thomson-Houston Co., Ltd. November 26th, 1932. (406961.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from March 21st:—

Diana. No. 546254. Class 6. Vacuum cleaning machines.—Markt & Co. (London), Ltd., 23, Portpool Lane, Gray's Inn Road, E.C.1.

Purmax. No. 547970. Class 8. Dry batteries (not for medical purposes).—Vee Cee Dry Cell Co. (1927), Ltd., 2-4, Northwold Buildings, Northwold Road, Stoke Newington, N.16.

Urdox (lettering and design). No. 548186. Class 8. Electric resistances.—Osram Gesellschaft, Berlin. (British representatives: Cruikshank & Fairweather, 65-66, Chancery Lane, W.C.2.)

Metrum. No. 548082. Class 8. Apparatus for rectifying alternating electric currents.—Conradty Products, Ltd., 101, Wardour Street, W.1.

Flag (design only). No. 546756. Class 13. Sparking plugs.—Goodyear Tire & Rubber Co., Akron, O., U.S.A. (British representatives: Mewburn, Ellis & Co., 70-72, Chancery Lane, W.C.2.)

Durex. No. 548497. Class 13. Junction boxes and fittings for electric lighting and power installations.—Simplex Electric Co., Ltd., 159, Great Charles Street, Birmingham.

Dinah Do. No. 546057. Class 18. Electric ovens.—F. G. Scott, Sutherland Cottage, Lower Camden, Chislehurst, Kent.

An Edison Memorial

A scheme to build a £400,000 mausoleum surmounted by a marble obelisk 350 ft. high as a memorial to Thomas Edison has been approved by his family. It is expected that the monument will be built by the International Edison Foundation on Eagle Rock in West Orange. This rock, jutting out from the Orange Mountains, is one of the most famous landmarks of the Lower Hudson River valley. The obelisk will taper off into the outline of two huge hands holding a giant incandescent electric light bulb. At its base will be a bronze statue of Edison. There will be a memorial park at the back of the tomb.—*Reuter* (West Orange, N.J.).

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editor.

Aintree—Factory, Long Lane, for Nelson Preserving Co.; Medcalf & Medcalf, architects, 3, Stanley Street.

Amblecote (WORCESTERSHIRE).—Houses (24); Webb & Gray, architects, High Street, Dudley.

Amersham.—Church, Amersham Common (£5,000); incumbent.

Auchtermuchty (CUPAR).—Houses (12); Marshall Gorrie, borough surveyor, High Street.

Aylesbury.—Houses (52); borough surveyor.

Baldock (HERTS).—Houses (40); U.D.C. surveyor.

Banffshire.—School, Brae Flett, Findochty, for C.C.; Offices, County Buildings, Banff.

Barnes.—Thirty-three flats (£12.100); E. H. Wale, Ltd., builders.

Batley.—Houses (203); H. Hall, surveyor, Town Hall.

Becontree.—Cinema (3,000 seats), junction of Eastern Avenue and Perth Road, Valentine's Park; G. Coles, architect.

Bewdley.—Houses (34); S. J. Rowe, borough surveyor.

Birmingham.—Factory, Whitmore Street, Hockley, for Rabone & Sons, Ltd.; Maddocks & Walford, builders, Tyburn Road, Erdington.

Bishop's Stortford.—Houses (56), London Road; U.D.C. surveyor.

Bo'ness.—Houses (150); Wm. Beattie, burgh surveyor, Town Hall.

Boreham Wood (HERTS).—Post office and telephone exchange, for H.M. Office of Works, King Charles Street, London, S.W.

Brighton.—Flats, Woburn Place (£19,756); Rice & Son, Ltd. Bathing pool and car park, Black Rock (£90,000); borough engineer. Infants' school, Whitehawk Estate (£14,895) for E.C.

Brownhills (STAFFS).—Houses (300); U.D.C. surveyor.

Burslem.—Welfare centre, near Massey Square; Stoke-on-Trent, city engineer. Extensions, Marsden Tile Works, Newcastle Street; Watkin & Maddox, architects.

Carlton (NEAR BARNSLEY).—Houses (90), Ring Road; J. Wilkinson, architect, Regent Street, Barnsley.

Carnforth.—Houses (24); U.D.C. Surveyor.

Colwyn Bay.—Winter Gardens, including theatre and dance hall for U.D.C.

Coventry.—Houses (240), £31,205; city engineer.

Crayford.—Houses (33); U.D.C. surveyor.

Dagenham.—Cinema (2,500 seats) opposite Heathway Station; Lewis Solomon & Sons, architects, 21, Hart Street, W.C.1.

Dewsbury.—Houses (913); T. Blakeley, surveyor, Town Hall.

Dresden (STAFFS).—Houses, Cocknage Road; Mr. Lilley.

Droitwich.—Public offices and boardroom; Housing, Ltd., builders, Blackheath, Birmingham.

Dumbarton.—Houses (100); A. W. Jeffrey, burgh surveyor, Dhuvon, Stirling Road.

Eastleigh & Bishopstoke.—Public library, lecture hall, &c.; U.D.C. surveyor.

Elgin.—School, Bishopmill (£12,000); Dr. Maclaren, director of Education.

Essex.—Extensions, Chingford Senior schools, for County E.C.; J. Stuart, county architect, Chelmsford.

Exeter.—Houses (350), Wonford; city architect.

Faversham.—Cinema, Market Place, for the Odeon Circuit; P. W. Campbell, manager of the Friars Cinema, Canterbury.

Glasgow.—Church, Shettleston Road, for the Episcopal Church; Whyte & Galloway, architects, 121, Bath Street. Church, Shieldhall, for Govan Central Congregation of the United Free Church of Scotland (Continuing); the minister. Motor service station; Stanford, Wylie & Fraser, Ltd., 123, Mansion Street, Possilpark.

Glossop.—School (120 places), St. Mary's Road; St. Mary's Catholic trustees.

Grantham.—Extensions, including new wards, hospital; Traylen & Lenton, architects, 16, Finkin Street.

Great Yarmouth.—Houses (20); borough surveyor.

Halifax.—Houses (1,977); A. Tipple, surveyor, Town Hall.

Hanley.—Houses (23), Central Avenue, Bucknall; F. J. Williams. Houses (22), Rothesay Avenue; Barlow Bros. Buildings, Etruria Road; Dallas & Lloyd, architects, Birmingham.

Hereford.—Houses (90), Hinton Lane; Alastair, Maclennan & Co.

High Wycombe.—Post office (£20,000); James & Sons, builders, Maidenhead.

Huddersfield.—Houses (239); L. Smith, architect, Town Hall.

Jarrow-on-Tyne.—Maternity home; Governors, Ellison Hall Infirmary. Alterations to Catholic church, Chapel Road; Rev. Father McDonnell.

Kent.—Extension, Dover Institution (£50,000); county architect, Maidstone.

Lanarkshire.—R.C. School extension, Cadzow, Hamilton (£2,500) for C.C.; Lanarkshire House, Ingram Street, Glasgow.

Lincolnshire.—Schools, Immingham Dock (£17.500), Waltham Cross roads (£14,400), and extensions, Skegness (£6,800), Morton (£3,500), and Clee Grammar School (£14,000), for Lindsey E.C.; Director of Education, Lincoln.

Liverpool.—Factory, Binns Road, for Meccano, Ltd.; Wm. P. Horsburgh, architect, D.16, Exchange Buildings.

London.—(BRIXTON).—Elementary school, Vassall Street; L.C.C. architect. (CHELSEA).—Blocks of flats, World's End Passage, for the Chelsea Housing Improvement Society, Ltd.; Mr. Soutar, architect. Shelters, Chelsea House, Lowndes Street; Sir John Burnet, Tait & Lorne. (E.C.).—Rebuilding 154-6, Fenchurch Street; Sackville Estates (London), Ltd. (FULHAM).—Buildings (£2,000), Beaufort Mews; Provident Clothing Co., Ltd., The Colonnade, Bradford. (HACKNEY).—Town Hall; Lancaster & Lodge, architects. (HOMERTON).—Isolation block, Eastern Hospital (£13,130); Chas. S. Foster & Sons, Loughton. (POPLAR).—Dwellings, Old Ford Road (£9,469); borough engineer. February, 241-7, Bow Road; R. & Andrews, (POPLAR).—Town Hall revision (£150,000); Culpin & Bowers, architects. (STRAND).—New streets, &c., Adelphi Estate; J. J. Joass, architect. (WESTMINSTER).—Flats and shops, Arlington Street; M. Rosenauer, 1, Upper George Street, W.1. Block of flats, Page Street and Marsham Street; Sir Aston Webb & Son. Buildings, Carrington House site, Mayfair; W. & E. Hunt. Buildings, 169-171, Oxford Street, Mr. Morris de Metz. Frontage lines, St. George's Hospital, Knightsbridge; Adams, Holden & Pearson. Rebuilding, 17-18, Panton Street; Kayler & Lay.

(BERMONDSEY).—Tenements, Dickens Estate (£12,715); Rowley Bros., Ltd. (BETHNAL GREEN).—Tenements, Hollybush Gardens (£32,000); L.C.C. architect (ISLINGTON).—Tenements, Northampton Street (£28,500); L.C.C. architect. (KENNINGTON).—Tenements (£9,147), L.C.C. Estate; Rowley Bros., Ltd. (TOTTENHAM).—Houses (26), Devonshire Hill Lane; G. Reed & Sons. Factories, Selby Road; R. Tee & Gale. Four factories, West Road; E. G. Brown. Factory extension, Bernard Road; H. S. Stone & Co. Factory extension, West Road; British Tungsram Radio Works, Ltd. (WATERLOO).—New Bridge (£1,295,000), for L.C.C.

Longton (STAFFS).—Houses (12), Belgrave Road; H. Gilbert. Houses (25), Drubbery Lane; Holloway & Co.

Manchester.—Assembly Hall and new wing to Loreto Convent, Moss Lane, Hulme; Hill, Sandy & Norris, architects, 9, Albert Square.

Melksham.—Houses (16); U.D.C. surveyor.

Middlesbrough.—Extensions to Dorman Museum (£7,000); S. E. Burgess, borough engineer.

Middlesex.—Technical Institute, Twickenham, for C.C.; clerk, 38, Eccleston Square, S.W.

Morden.—Houses (1,357), St. Helier Estate (£456,982); L.C.C. & C. J. Wills & Sons, Ltd.

Motherwell.—Cinema (2,000 seats); J. Wilson, junior, and and McGill, Oakfield Chambers.

Newcastle-on-Tyne.—Houses (50), Earle's Drive and Cundercum Lane area; R. Bramley & Co., builders, Ensign Works, Leazes Lane. Reconstruction of Holy Jesus Hospital for C.C. (£16,000); F. H. Holford, city architect.

North Uist.—Electric lighting installation, Lochmaddy Hotel; the proprietor.

Pontefract.—Houses (202), slum clearance; R. Smith, surveyor, Municipal Offices.

Rotherham.—School (400 places), Coleridge Road, for Borough E.C.; director of education.

St. Helens (LANCS).—Central workshops and depôts (£40,700); borough surveyor.

Sanderstead.—Houses (300), Briton Hill Farm Estate; Morgan Baines & Clark. Houses (34), Mitchley Avenue; Truett & Steel, Ltd. Houses (10), the Windings; F. C. Woodruff.

Sanquhar.—Houses (28), Queen's Road; burgh surveyor.

Scarborough.—Houses (408) and 56 houses for aged people; borough surveyor.

Shipley.—Houses (46), Grosvenor Road; H. Chippindale. Houses (34), Wrose Road; Walton Bros.

Shrewsbury.—Houses (54), Detherington (£16,288); Nicholas & Son, builders, Colehain.

Skegness.—Foreshore development scheme, with café, administrative buildings, &c. (£13,750); U.D.C. surveyor.

Southampton.—Extensions, Children's Hospital; Gutteridge & Gutteridge, architects, 9, Portland Street.

Southend-on-Sea.—Factory, Stanfield Road, for St. Ann's Manufacturing Co.

South Shields.—Branch, Sunderland Street, for South Shields Savings Bank, Barrington Street; Morton & Son, architects, Martins Bank Chambers.

Sowerby (YORKS).—Houses (34) and bungalows; J. Eastwood, U.D.C. surveyor.

Stafford.—Council chamber, court room, and shopping arcade (£18,149); F. Espley & Son, builders.

Stranraer.—Houses (60); J. Mercer, burgh surveyor, Municipal Buildings.

Swansea.—Houses (20), Brynswel Road; R. W. K. Colley. Houses (12), Dunvant Road; Griffiths, Davies & Co. Flats (40), Walter Road; Estateways Builders, Ltd.

Swindon.—Houses (60), Croft Road; A. J. Colborne. Houses (106), Marlborough Road, &c.; E. H. Bradley & Sons.

Taunton.—Factory extensions, Princes Street, for Harding, Tilton & Hartley, Ltd.

Teddington.—Extensions to Memorial Hospital (£8,500); W. A. Gibson, builder.

Tonbridge.—Cottage hospital (£8,000), for the Committee; secretary.

Torquay.—Electricity offices and showrooms; P. W. Ladmore, borough engineer.

Tunstall.—Houses (58); Bidulph Road; T. B. Cartlidge. Cinema, High Street; Ritz Cinema (Tunstall), Ltd.

Wallasey.—Houses (24), Macdonald Road; H. W. Brownlow. Houses (24), Poulton Road; E. McGeoch. Estate development, Douglas Drive; James & Escolme. Re-development of Massey Street; borough engineer.

Wealdstone (MIDDLESEX).—Extensions to works (£250,000) for Kodak, Ltd.

West Riding.—Senior school, Darton, Barnsley; H. Wormald, architect, County Hall, Wakefield.

Wolverhampton.—Houses (146), Derry Street (£38,428); A. M. Griffiths & Son, builders, Thomas Street.

Worsborough.—Houses (54); T. Shield, surveyor, Saville House, Worsborough Bridge.

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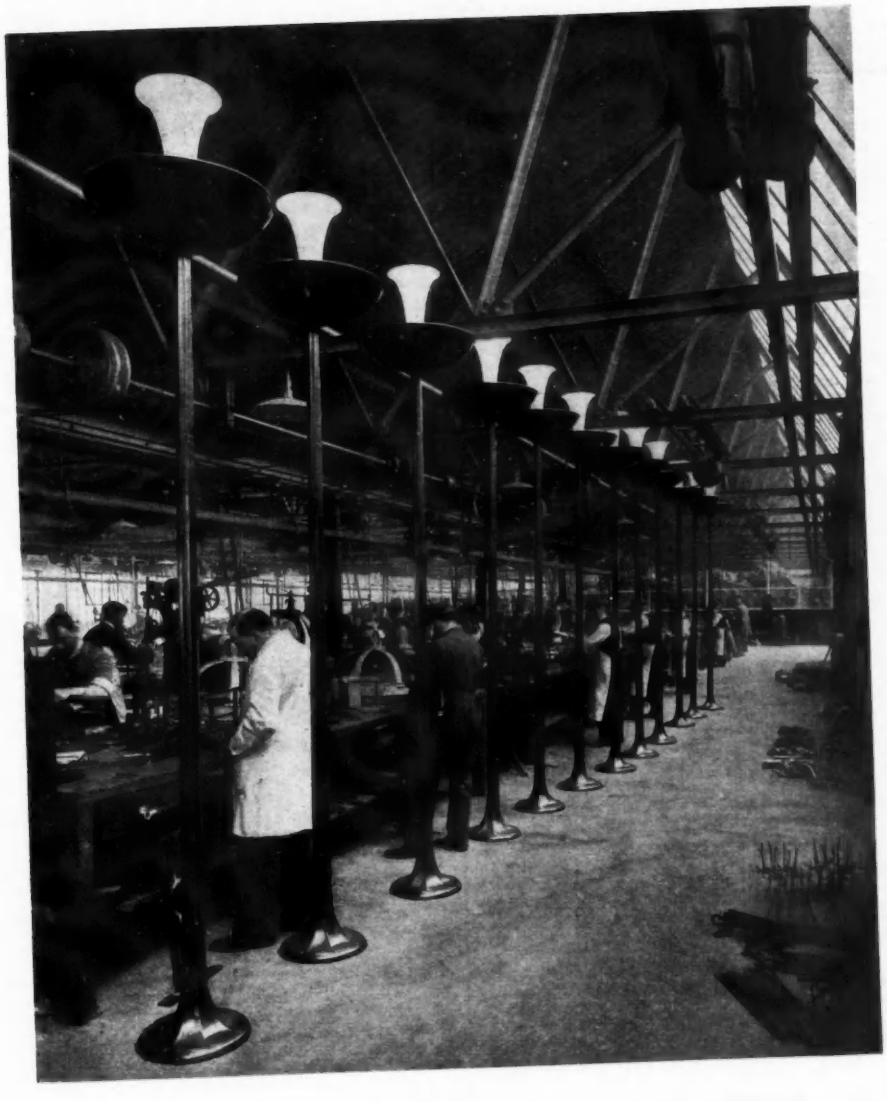

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COMPANY MEETING.

THE BRITISH INSULATED CABLES, LTD.

The thirty-eighth ordinary general meeting of shareholders of the above Company was held on Tuesday, March 27th, 1934, at Exchange Station Buildings, Liverpool.

Sir Alexander Roger, Chairman of the Company, presided over a good attendance of shareholders.

Mr. Alex. Crook, secretary, read the notice convening the meeting.

The Chairman, in proposing the adoption of the report and accounts, said the result of last year's operations accorded with the anticipation he hazarded a year ago. The profit amounted to £517,455, compared with £589,275 for the previous year, a fall of £71,820. The trading profit was disappointing, and arose mainly from a decline in orders affecting particularly some of the large and older departments, but he was glad to say that present prospects indicated some improvement. With the amount brought forward of £301,123, the disposable balance was £818,578. In addition to the interim dividend a further dividend of 10 per cent. on the ordinary shares was proposed, making 15 per cent. for the year, and after other appropriations there remained to be carried forward £300,724.

The addition of £60,000 to reserve account brought that fund to £1,320,000, and £100,000 had been allocated to depreciation. Dividend Equalisation Fund at £300,000 and Workpeople's Compassionate Fund at £50,000 remained as before.

Works Efficiency.

About £130,000 had been spent on modernising plant and buildings, and on additional manufacturing facilities. In certain products the demand was beyond their capacity to supply, necessitating working portions of the plant day and night. Shareholders would agree it was sound policy in these times to take advantage of every opportunity to increase business in any special direction. In the last six years over £800,000 had been spent on plant and machinery, all of which had contributed to maintaining the Company's position, and was ample justification for the policy of not distributing profits up to the hilt.

As usual a careful estimate of the value of the investments had been made, and their intrinsic value, in the opinion of the Board, was substantially more than the figures at which they stood in the Company's books.

Copper Refining Enterprise.

Last year (Sir Alexander proceeded) I referred to our new enterprise, British Copper Refiners, which at that time had recently commenced operations. I am glad to be able to tell you that the success then indicated has been sustained. Not only have we disposed of our contract quantity of copper, but we have exercised our option upon additional tonnage, the whole of which we have so far been able to sell readily. The plant has worked well, the quality of the finished copper is up to our highest expectations, and the financial results are eminently satisfactory.

At one time it was probable that we should not be able to retain the whole of the share capital of British Copper Refiners, Ltd., in our own hands, but we have effected arrangements whereby that Company will continue as a hundred per cent. subsidiary of the B.I. Company.

High Quality Products.

Last year was the worst, both in the matter of turnover and of profit rate, that we have had for a long time. Competition is continually on the increase, and it is astonishing how, from time to time, new firms will start in the heavy cable-making industry, in spite of the fact that there is insufficient work available for half the plant already in the country.

Such firms may for a time secure some business at prices with which we cannot compete if our standard of quality is maintained, and in some cases may be able to make good losses in cable-making from profits derived from other sources, but purchasers must be alive to the risks they run without such guarantee as the high reputation and technique of our old-established Company gives. We stand behind the goods we sell.

The cable-making business is trending away from the heavier towards the lighter types of material, due to the transmission of power at higher and higher potentials, and to the spread of business in telephones and wireless apparatus.

Fine Wire Marvel.

As an instance of this, I may mention that a few years ago a large portion of our business was in heavy material, and it was quite common for us to have orders for cables with conductors having a square inch of copper in them, whereas a substantial part of our business is now in lighter materials, and we have lately installed machinery to manufacture wire of a diameter of two one-thousandths of an inch, finer than a human hair, and a pound of which has a length of 15½ miles, and further machinery to coat this wire with an electrical insulation consisting of enamel, five coats of which have a radial thickness of only two ten-thousandths of an inch.

Another change to which we have had to adapt ourselves is the remarkable diminuation of the average value of the orders we receive as compared with a few years ago. Fortunately, this is balanced by an increase in the number of orders. Its cause is traceable to the reluctance of buyers to purchase anything beyond their immediate requirements, particularly when they can, as in most cases, rely on us to give prompt delivery out of the stocks we carry. We are in fact now to a large extent carrying the stock formerly carried by our customers. Recognising that this is a feature of a permanent character and that the B.I. name and reputation has been built on the best service at all times to our customers, we have reorganised our departments to deal with prompt deliveries, and have to a large extent mechanised our clerical work.

As indicating the wide range of your Company's products, you will be interested to know we have 134 different items of manufacture. We manufacture every possible requirement of bare or insulated conductors that could be asked for by any user, and I may mention that we have as many as six different and complete systems for the wiring of factories, offices, collieries and private houses, so that every requirement of consulting engineers or wiring contractors can be fully complied with.

In this connection we would ask our shareholders to be good enough not only to use their Company's products for their own needs, but also to recommend our manufactures whenever a case comes to their knowledge in which electrical conductors of any kind are required.

Current and Cables.

No doubt you have seen from the annual report of the Central Electricity Board that the consumption of electricity during 1933—bad year as it was for business generally—increased by 10.7 per cent. over the year before. The most recent statistics show that this rate of improvement is rapidly increasing, and we are hoping that shortly there will be a greater demand for the heavier type of power cables, arising out of the need to supplement the existing distribution networks because of the heavier load taken for power purposes by factories throughout the country, and for heating and cooking by domestic consumers.

New Trading Conditions.

Among the nations, the chairman pointed out, industries were being reorganised in mass formation. Bargains were made between Governments acting as agents for business undertakings. The power of the State developed on lines which a few years ago would have been regarded as Socialism of the most advanced description. For himself he deplored the tendency in this country for industry after industry to confess it could not manage its own affairs, and to look to the Government to solve its troubles. Each industry should find its own solution to its own problem under the leadership of its own experts.

This country's prosperity was built on international trade conducted with energy and vitality, and they were now called upon to adapt themselves to entirely new conditions. This was not a task for one manufacturer, but for industry as a whole, and he was convinced that only through a greater degree of co-operation in each industry would our international trade, on which the country's greatness rested, be fully restored.

Larger Volume of Orders.

It is no easier to-day than it was a year ago (Sir Alexander concluded) to forecast the future. Since the middle of last year a steady improvement in our business has set in, and at the moment we have in hand a larger volume of orders than we had at this time a year ago. I think, therefore, that our prospects are better than they were.

In conclusion, I would like to acknowledge on your behalf, as well as the Board, the excellent work and loyalty of the staff and of the 10,000 men and women directly employed by the company at home and abroad, whose labours maintain our high reputation. We especially acknowledge the untiring efforts of our managing director, Mr. G. H. Nisbett, in furthering the best interests of the company. His fertility in ideas, rapidity in action, and whole-hearted devotion to the company are of inestimable value. (Applause.)

The report and accounts were adopted. 4723

The Electric Tramcar Hand-book

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